

Service Manual

LG-T515

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1. INTRODUCTION

1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

1.2 Regulatory Information

A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunication service of facilities accessed through or connected to it.

The manufacturer will not be responsible for any charges that result from such unauthorized use.

B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

D. Maintenance Limitations

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

G. Interference and Attenuation

Phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

H. Electrostatic Sensitive Devices

ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the sign. Following information is ESD handling:



- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current – Constant Voltage
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milli watt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPIO	General Purpose Interface Bus
GSM	Global System for Mobile Communications
IPUI	International Portable User Identity
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LDO	Low Drop Output
LED	Light Emitting Diode
OPLL	Offset Phase Locked Loop

1. INTRODUCTION

PAM	Power Amplifier Module
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
PLL	Phase Locked Loop
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RLR	Receiving Loudness Rating
RMS	Root Mean Square
RTC	Real Time Clock
SAW	Surface Acoustic Wave
SIM	Subscriber Identity Module
SLR	Sending Loudness Rating
SRAM	Static Random Access Memory
PSRAM	Pseudo SRAM
STMR	Side Tone Masking Rating
TA	Travel Adapter
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
UART	Universal Asynchronous Receiver/Transmitter
VCO	Voltage Controlled Oscillator
VCTCXO	Voltage Control Temperature Compensated Crystal Oscillator
WAP	Wireless Application Protocol

2. PERFORMANCE

2.1 H/W Features

Item	Feature	Comment
Standard Battery	Lithium-Ion, 3.7V 1100mAh	
Stand by TIME	Up to 696 hrs : Paging Period 5, RSSI 85dBm	
Talk time	Up to 14hrs : GSM Tx Level 7	
Charging time	Approx 3hours	
RX Sensitivity	GSM, EGSM: -108dBm, DCS: -108dBm	
TX output power	GSM850 : 32.3dBm, EGSM: 32.8dBm(Level 5), DCS , PCS: 29.8dBm(Level 0)	
GPRS compatibility	Class 12	
SIM card type	3V / 1.8V	
Display	MAIN : 2.8" TFT 240 × 320 pixel 262K Color	
Status Indicator	Send Key, End Key, Cancel Key, Volume Up/Down Key, PWR(Lock) Key	
ANT	Internal	
EAR Phone Jack	Yes (3.5Φ)	
PC Synchronization	Yes	
Speech coding	EFR/FR/HR	
Data and Fax	Yes	
Vibrator	Yes	
Loud Speaker	Yes	
Voice Recoding	Yes	
Microphone	Yes	

2. PERFORMANCE

Item	Feature	Comment
Speaker/Receiver	18x12Φ Speaker/ 1107 Receiver	
Travel Adapter	Yes	
MIDI	SW MIDI (Mono SPK)	
Camera	2.0M FF	
Bluetooth / FM Radio	Bluetooth version 2.1 / Wired FM radio (Earphone needed)	

2.2 Technical Specification

Item	Description	Specification					
1	Frequency Band	GSM850 TX: 824 ~ 849 MHz RX: 869 ~ 894 MHz DCS TX: 1710 ~ 1785 MHz RX: 1805 ~ 1880 MHz PCS TX: 1850 ~ 1910 MHz RX: 1930 ~ 1990 MHz					
		EGSM TX: 880 ~ 915MHz RX: 925 ~ 960 MHz					
2	Phase Error	RMS < 5 degrees Peak < 20 degrees					
3	Frequency Error	< 0.1 ppm					
4	Power Level	GSM850/EGSM					
		Level	Power	Toler.	Level	Power	Toler.
		5	33dBm	±2dB	13	17dBm	± 3dB
		6	31dBm	±3dB	14	15dBm	± 3dB
		7	29dBm	±3dB	15	13dBm	± 3dB
		8	27dBm	±3dB	16	11dBm	± 5dB
		9	25dBm	±3dB	17	9dBm	± 5dB
		10	23dBm	±3dB	18	7dBm	± 5dB
		11	21dBm	±3dB	19	5dBm	± 5dB
		12	19dBm	±3dB			
		DCS/PCS					
		Level	Power	Toler.	Level	Power	Toler.
		0	30dBm	±2dB	8	14dBm	± 3dB
		1	28dBm	±3dB	9	12dBm	± 4dB
		2	26dBm	±3dB	10	10dBm	± 4dB
		3	24dBm	±3dB	11	8dBm	± 4dB
		4	22dBm	±3dB	12	6dBm	± 4dB
		5	20dBm	±3dB	13	4dBm	± 4dB
		6	18dBm	±3dB	14	2dBm	± 5dB
		7	16dBm	±3dB	15	0dBm	± 5dB

2. PERFORMANCE

Item	Description	Specification	
5	Output RF Spectrum (due to modulation)	GSM850/ EGSM	
		Offset from Carrier (kHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600~ <1,200	-60
		1,200~ <1,800	-60
		1,800~ <3,000	-63
		3,000~ <6,000	-65
		6,000	-71
		DCS/PCS	
		Offset from Carrier (kHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600~ <1,200	-60
		1,200~ <1,800	-60
		1,800~ <3,000	-65
		3,000~ <6,000	-65
		6,000	-73
6	Output RF Spectrum (due to switching transient)	GSM850/ EGSM	
		Offset from Carrier (kHz).	Max. dBm
		400	-19
		600	-21
		1,200	-21
		1,800	-24

2. PERFORMANCE

Item	Description	Specification		
6	Output RF Spectrum (due to switching transient)	DCS/PCS		
		Offset from Carrier (kHz).		Max. dBm
		400		-22
		600		-24
		1,200		-24
		1,800		-27
7	Spurious Emissions	Conduction, Emission Status		
8	Bit Error Ratio	GSM850, EGSM BER (Class II) < 2.439% @-102 dBm DCS,PCS BER (Class II) < 2.439% @-100 dBm		
9	RX Level Report Accuracy	±3 dB		
10	SLR	12±3 dB		
11	Sending Response	Frequency (Hz)	Max.(dB)	Min.(dB)
		100	-12	-
		200	0	-
		300	0	-12
		1,000	0	-6
		2,000	4	-6
		3,000	4	-6
		3,400	4	-9
		4,000	0	-
12	RLR	4±3 dB		

2. PERFORMANCE

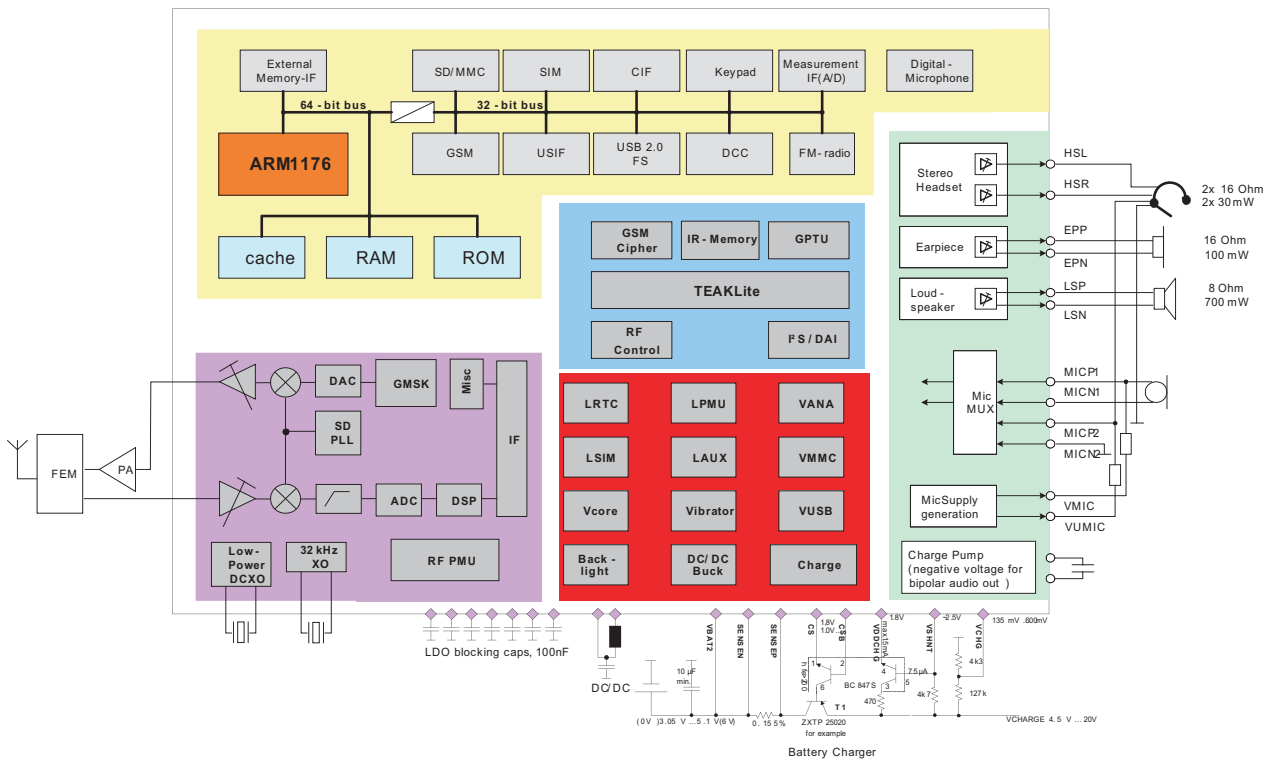
Item	Description	Specification		
13	Receiving Response	Frequency (Hz)	Max.(dB)	Min.(dB)
		100	-12	-
		200	0	-
		300	2	-7
		500	*	-5
		1,000	0	-5
		3,000	2	-5
		3,400	2	-10
		4,000	2	
		* Mean that Adopt a straight line in between 300 Hz and 1,000 Hz to be Max. level in the range.		
14	STMR	> 17 dB		
15	Stability Margin	> 6 dB		
16	Distortion	dB to ARL (dB)		Level Ratio (dB)
		-35		17.5
		-30		22.5
		-20		30.7
		-10		33.3
		0		33.7
		7		31.7
		10		25.5
17	Side Tone Distortion	Three stage distortion < 10%		
18	System frequency (13 MHz) tolerance	≤ 2.5 ppm		
19	32.768KHz tolerance	≤ 30 ppm		
20	Ringer Volume	At least 55 dBspl under below conditions: 1. Ringer set as ringer. 2. Test distance set as 1 m		

2. PERFORMANCE

Item	Description	Specification	
21	Charge Current	Fast Charge : Typ. 400 mA Slow Charge : Typ. 95mA Total Charging Time : < 3.5 hours	
22	Antenna Display	Bar Number	Power
		7	Over -92
		7 -> 5	-93 \pm 2
		5 -> 4	-98 \pm 2
		4 -> 2	-101 \pm 2
		2 -> 1	-104 \pm 2
		1 -> 0	-106 \pm 2
		0 -> OFF	Under -106
23	Battery Indicator	Battery Bar Status	Percent (%)
		Full (16 level)	\geq 94%
		Decrease gradually	94~10%
		Battery icon color : Green \rightarrow Red	\leq 10%
		Empty(0 level)	\leq 2%
24	Low Voltage Warning (Blinking Bar)	10%, 5% 2times (standby) – Speaker	
		\leq 10% at every 1min. (call) - Receiver	
25	Forced shut down Voltage	0% (about 3.35V)	
26	Sustain RTC without battery	Over 2 hours	
27	Battery Type	Lithium-Ion Battery Standard Voltage = 3.7 V Battery full charge voltage = 4.2 V Capacity: 950mAh	
28	Travel Charger	Switching-mode charger Input: 100 ~ 240V, 50/60 Hz Output: 4.8V, 400mA	

3. TECHNICAL BRIEF

3.1 Digital Main Processor



3.1.1 General

- Technology:
 - SoC, Monolithic, 65 nm CMOS
- Package:
 - eWLB, 8x9 x0.8 mm
 - 0.5 mm pitch
 - 240 balls / 6-layer PCB

3.1.2 RF Transceiver

- Dual-band direct conversion receiver
- Tri/Quad-band possible with external circuitry
- Fully integrated digital controlled XO
- Additional buffer for 2 external system clocks
- Fully digital RF-Synthesizer incl. $\Sigma\Delta$ -Transmitter

3.1.3 Baseband

- DSP:
 - 156 MHz TeakLite™
- MCU:
 - ARM1176® @ 208 MHz
- MCU RAM:
 - 3.00Mbit
- Memory I/F:
 - 1 Gbit NOR flash/OneNAND flash/SDR SDRAM
 - 4 Gbit NAND flash/DDR SDRAM
- Modem:
 - GPRS class 12, (RX/TX CS1-CS4)
 - EGPRS class 12, (RX MCS1-MCS9, TX MCS1-MCS4)
- Cipher Units:
 - A51/2/3
 - GEA-1/2/3
- Security:
 - OMTP TRO
 - Secure Boot
 - RSA(ROM)/SHA-1(HW accel.)
 - OCDS disabling
 - Certificate Management
- Speech Codec:
 - FR / HR / EFR / NB-AMR
- Audio Codec (running on ARM1176):
 - SP-MIDI
 - SB-ADPCM
 - MP3
 - WB-AMR
 - AAC/AAC+/eAAC+
- Others:
 - DARF (SAIC)
 - TTY
- Customization:
 - E-Fuses

3.1.4 External Memory

- External Bus Unit
 - 16-bit address bus
 - 16-bit address/data muxed bus
 - 1.8V support
- Flash / RAM
 - NOR Type
 - NAND Type (1 bit ECC supported)
 - Parallel Flash / Cellular RAM(Page & Burst Mode)
 - 16-bit AD-multiplexed
 - 16-bit AAD-multiplexed
 - iNAND Type e.g. oneNAND
 - SDRAM
 - DDR SDRAM : up to 4 Gbit
 - SDR SDRAM : up to 1 Gbit
- Memory card
 - SD/MMC card interface with 1 or 4 data lines

3.1.5 Connectivity

- 3xUSIF (configurable either as SPI or UART), I2C, I2S; Interfaces @ 1.8V
- Direct (U)SIM 1.8/3V
- USB2.0 up to 480 Mbit/s (High Speed) w/ external USB Phy over ULPI interface
- Stereo Headset (Amplifier integrated)
- 3 external analog measurement PIN's
- Bluetooth

3.1.6 Mixed Signal

- Improved audio performance
- Loudspeaker Audio Class D Amplifier, 700 mW@8 Ω mon for hands-free and ringing
- Stereo Headset 2x30 mW@16 Ω w/o coupling C
- Mono Earpiece 100 mW@16 Ω
- Digital microphone supported
- Differential microphone inputs

3.1.7 FM Radio

- Integrated FM radio
 - FM Stereo RDS Receiver
 - Sensitivity 2 μ V EMF
 - Support for US & EU bands
 - Stereo recording

3.1.8 Power Management

- Direct-to-Battery Connection
 - LDOs (incl. capless)
 - DC/DC step-down converter
 - DC/DC step-up for white LED supply
- Battery Type
 - Li-Polymer
- Charging control
 - Battery temperature
 - Watchdog protection
 - Start-up on flat battery
- External Charger
 - Switch mode
- USB battery charging
 - USB charging spec 1.0 compliant
- Backlight
 - Up to 4 serial white LEDs (integrated LDO)

3.1.9 Main LCD Display

- Type
 - 240*320, QVGA, 262k color (parallel)
- Interface
 - Parallel 8/9bit MIPI-DBI Type B
 - Serial MIPI-DBI Type C
 - Interf. voltage at 1.8V or 2.8V
- gRac - Display Controller (Hardware)
 - 30 fps Display update without DMA (up to 60 fps) (full or partial)
 - Video post processing Scaling, Rotation (90° steps), Mirroring
 - Overlay with alpha blending
 - Color conversion YUV -> RGB
 - 2D vector graphics (Lines, filled rectangles, Bit block transfer (e.g. sprites, scrolling, antialiased bitmap fonts))

3.1.10 Camera

- 2 Mpx YUV parallel interface
- HW JPEG encoder (39 Mpx/sec)
- 39 MHz Pixel Rate
- 15 fps@ 2 Mpx full resolution

3.1.11 Video Capabilities

- Video Decoding MPEG-4/H.263
 - QCIF@30 fps
 - QVGA@15fps
- Video Encoding MPEG-4/H.263
 - QCIF@15 fps

3.1.12 Audio Capabilities

- Polyphonic ring tones
 - 64 voices MIDI, SP-MIDI
 - FM synthesizer
- AMR-WB
- True ring tones (MP3)
- MP3, eAAC+
- G.722 SB-ADPCM encoding/decoding

A mobile platform requires power supplies for different functions. These power supplies are generated in the integrated power management Unit (PMU). The PMU is designed to deliver the power for a typical standard phone.

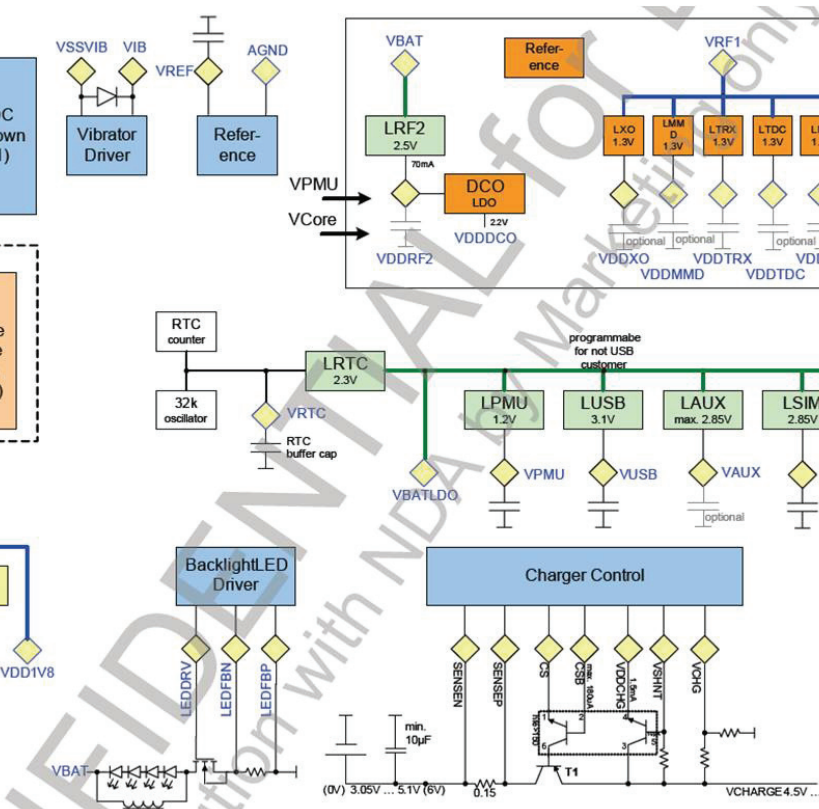


Figure. 3-2-1 Block Figure of the PMU Modules X-Gold tm 215

The DC/DC converter generates a 1.8V supply rail. This voltage rail is used to supply main parts of the system, like the digital core of the chip (via LDO LCORE), some parts of the mixed signal macro, parts of the RF macro and the external memory if a 1.8V memory is used. The efficiency of the DC/DC converter is optimized for an average load current of 100mA. That is the load current estimated for the GSM talk mode.

▪ **Linear voltage Regulators (low dropout) LDOs**

The LDOs are used to generate the supply for the different supply domains not directly supplied out of the DC/DC converter.

The VSIM output current is high enough to drive USB SIM cards.

▪ **LCORE**

The LCORE LDO provides the VCORE supply used for most of the digital parts of the chip

▪ **LPMU**

The LPMU provides VPMU supply for the PMU supply, e.g. for the startup state machine and analog parts like ADC, sense amplifier etc.

▪ **LUSB**

The LUSB LDO generates the supply for the USB transceiver (output driver and input). If no USB interface is required, LUSB can be used as general purpose LDO.

▪ **LAUX**

The LAUX generates VAUX. It is a general purpose LDO and can be used for different functions depending on the phone application, e.g. for the display or Camera.

▪ **LMMC**

The LMMC generates VMMC. It is a general purpose LDO and can be used e.g. for memory cards

▪ **LSIM**

The LSIM LDO generates the VSIM supply for the SIM card and interface. It is designed to supply Standard SIM cards.

▪ **Other LDOs**

The RF module has implemented several LDO's for different RF Power domain.

The mixed signal module has some LDO's for the audio driver and microphone supply.

Supply Domain LDO Name	Voltage	Max. Current	Output Cap	Input Domain	Comment
VBAT	0 ... 6.0 V				Operating range is 3.05 V ... 5.5 V, system emergency switch off voltage is about 2.8 V
VDD1V8	1.8 V	450 mA	22 μ F	VBAT	This voltage is generated by the DC/DC converter with 3.3 μ H inductor, The voltage is used for: Memory supply, and via LDO's for digital core supply, mixed signal supply and RF supply.
LCORE	1.2 V	300 mA	2x100 nF	VDD1V8	
LANA	1.3 V	10 mA	No	VDD1V8	No ball
LRTC	2.3 V	2 mA	≥ 100 nF	VBAT	This supply is only used for the HPBG, the 32.768 kHz oscillator and the real-time clock counter required during the sleep- and low-power mode.
LPMU	1.2 V	15 mA	100 nF	VBAT	Supply for the digital part of the PMU including digital control of DC/DC converter. This voltage is also used for the N-DEMOS driver of DC/DC converter and the class-D amplifier and the core PLL.
LUSB	3.1 V	40 mA	100 nF	VBAT	Used for the USB driver supply or as general purpose LDO with programmable output voltages (2.5 V, 2.85 V, 3.1 V)
LAUX	1.5 V ... 2.85 V	150 mA	470 nF	VBAT	General purpose LDO for e.g. Display, Bluetooth, Camera etc. Programmable output voltages are (1.5 V, 1.8 V, 2.5 V, 2.85 V)
LSIM	1.8 V / 2.85 V	30 mA	≥ 100 nF	VBAT	LDO dedicated to the SIM-Card supply. It is chip internal connected to the SIM interface driver.
LMMC	1.5 V ... 2.85 V	150 mA	≥ 470 nF	VBAT	General purpose LDO, targeted for MMC/SD card supply.
VDDNEG	-1.3 V	100 mA	100 nF	VDD1V8	Negative voltage for the bipolar headset audio driver. Generated by a charge pump.

Table. 3-2-1 Power supply Domains (without RF)

3.2.1 Power on and startup

▪ Analog startup Circuit

Because the POR circuit and the LPBG are directly connected to the battery, it is not possible to switch them off. If the battery voltage exceed the power on reset threshold (2.5V), the power on reset is released, the LPMU regulator and the LRTC voltage regulator are switched on. The LPMU regulator starts in its ultra-low power mode.

The LPMU regulator generates a control signal (lpmu_OK) that enables the 50KHZ PMU oscillator. The output clock of the oscillator is checked with a fully coded counter. A counter overflow releases the reset (vpmu_rst_n) signal for the small PMU state-machine.

▪ Small first digital State-Machine

The small PMU state-machine is always connected to VPMU. After starting from reset the small startup state machine enters the SYSTEM OFF state and only continuous the startup procedure if a switch on event like first connect, on-key, wake up or charge detect occurs.

▪ PMU-main State-Machine

The main PMU state-machine is always connected to VPMU also. The power up sequence driven by the PMU state-machine can be seen in Figure18. After enabling the reference (HPGB) and waiting for the settling time, the battery voltage is measured and compared with the power on threshold. If the battery voltage is high enough, the SD1 DC/DC converter and the LCORE LDO are started. A timer ensures that the supply voltage will be stable before the DCXO is enabled. The DCXO settling time is ensured using a fixed timer. After an overflow of this timer, the reset is released for the rest of the system. The PMU state machine remains in this System-ON state until the system is switched into the OFF state. For example the system sleep mode is completely configured by software(for example switching off the LDO's, switching of the DCXO etc.) and controlled by the VCXO_enable signal. The reason for the startup is stored in the ResetSourceRead register.

▪ Battery Measurement

The ADC and the oscillator for the ADC needs the VDD_ADC supply voltage from the LADC LDO. LADC uses either the charger voltage VDD_CHARGE or VDDRTC as input voltage. The input voltage is selected automatically by a bulk switch circuit. LADC, the ADC and the oscillator are enabled on request for every battery measurement if the charger unit is not running. This is handled by an ADC control block in one of the state-machines. If the charger unit is running the ADC is controlled by the charger state-machine

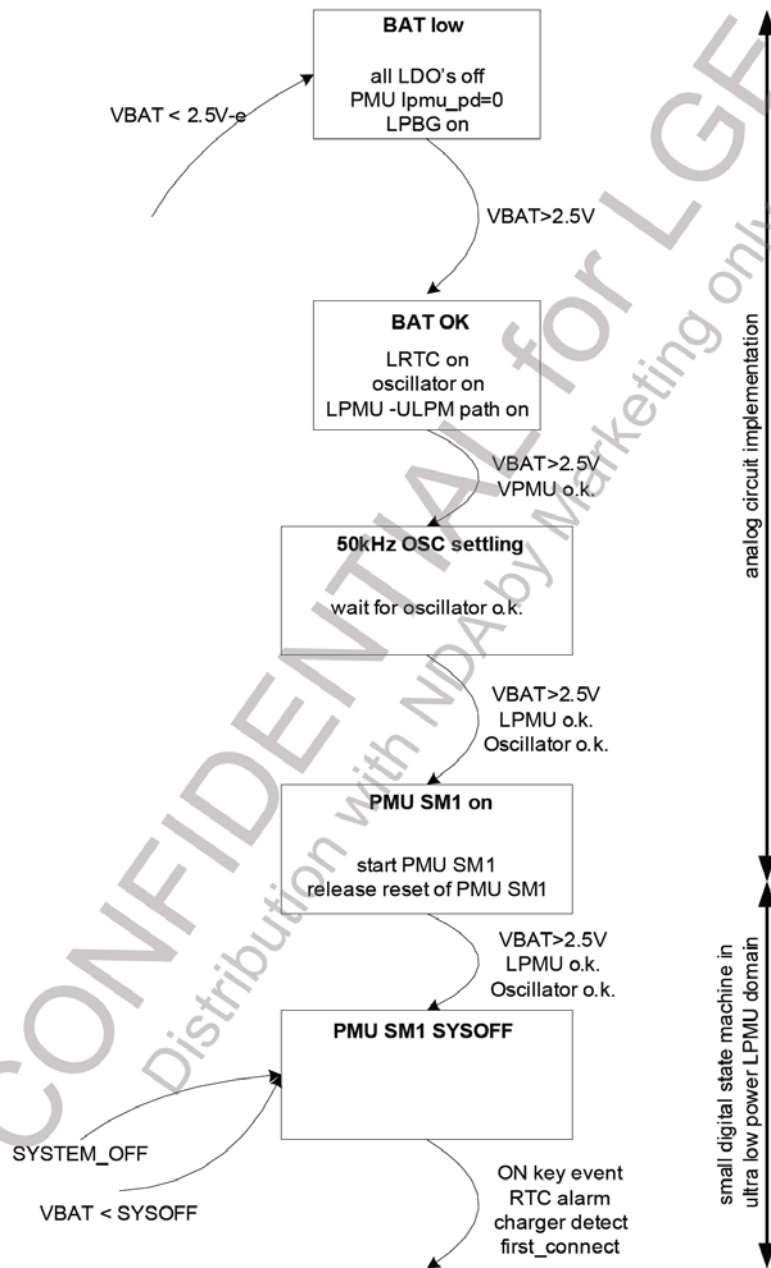


Figure.3.2.1 First Part of the State Machine, Running in Different Power Domains than the Second Part

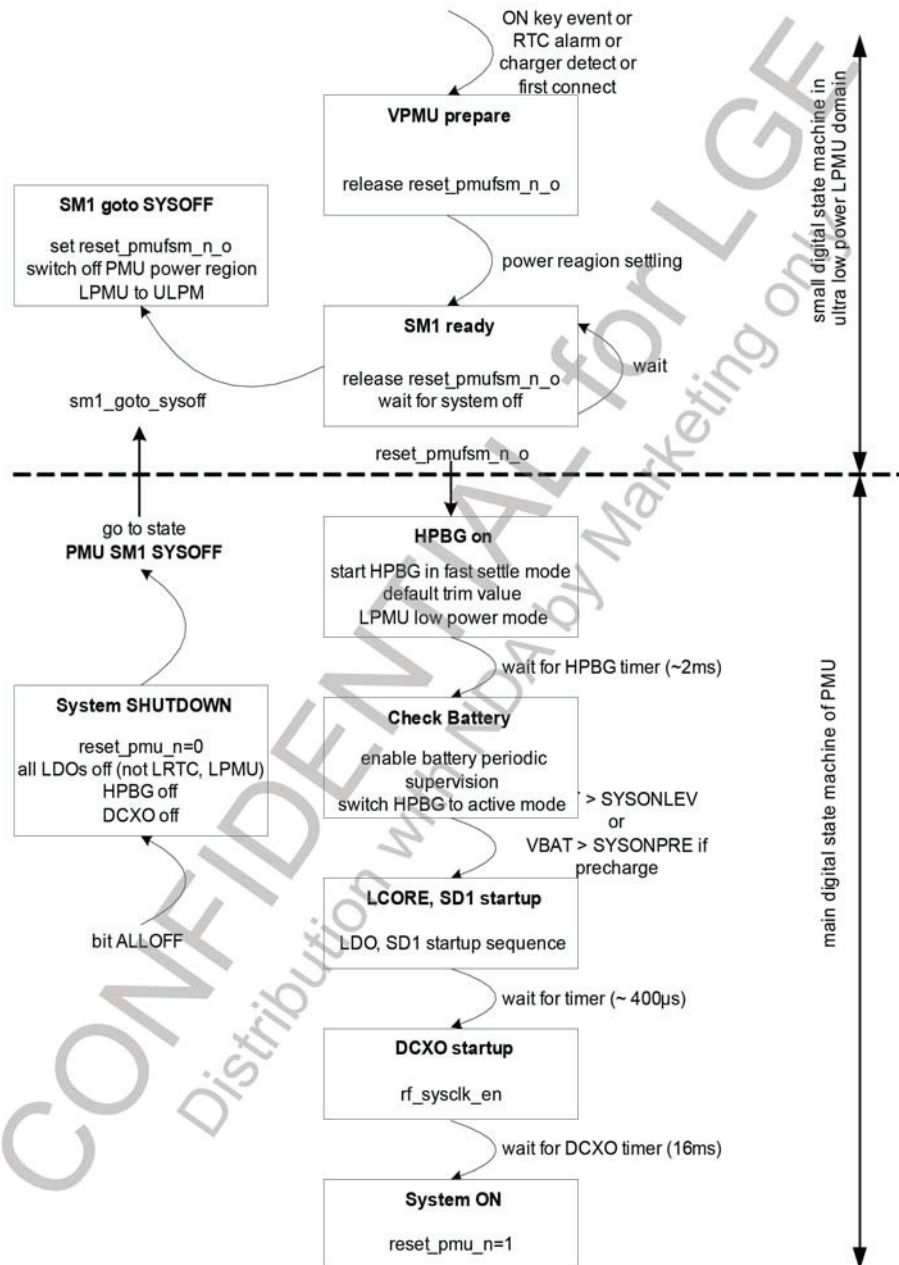


Figure 3.2.2 Second (Main) Part of the Startup State Machine in the VPMU Domain

3.2.2 Switching on due to first connect

If the battery voltage is connected the first time, that means the system enters the first time the SYSOFF state, this is stored in a first connect flag. If the first connect flag is set, the system will start immediately and not wait for any other system on event in the SYSOFF state.

3.2.3 Switching on due to on-Key event

The on key is connected to the ONKEY pad. The ESD protection and the input structure of this pad are connected to VRTC. If the ONKEY pad is forced to VRTC by an external key or similar circuit, the system starts. The ONKEY is sampled with the PMU clock. It has to be sampled four times high before a valid on event is generated. The status of the ON key can be read in the PMU registers, so it can be used as a functional key during phone operation also

3.2.4 Switching on due to RTC alarm

The real time clock can generate a wakeup signal called RTC alarm. This signal is sampled from the state-machine and after successfully detecting a high, the system is switched on.

3.2.5 Switching on due to charging

When a battery with a voltage below the SSONLEV level is inserted, the state machine will not start the system. As long as the battery voltage stays lower than SYSONLEV the system will stay off. The only possibility to start up the system is due to an external charger.

If an external charger is connected and detected and the battery is charged above the SYSONPRE voltage level the system will start up.

The PMU main state machine waits in the Check battery state until the battery voltage condition is fulfilled. The charger state machine provides the necessary pre-charge indication signal. This pre-charge signal is denounced in a small counter to have a stable signal. This is important, especially in half/full-wave charging where the charger detection is switching between charger detected/not detected according the AC supply frequency. reasons

For details on pre-charging see the charger chapter. The charger is controlled by an independent state machine. The pre-charge signal is used to trigger the pre-charge signal is used to trigger the pre-charge functionality. The charger state machine fully control the pre-charge, the PMU-state machine now changes to state HPBG on state and the system starts. This state change is indicated to the charger state-machine to enable the charger watchdog for safety

3.2.6 Power Supply Start-up sequence

In order to avoid an excessive drop on the battery voltage caused by in-rush current during system power-on, possibly leading to system instability and “hick-ups” a staggered turn-on approach for the regulators is implemented. The regulators are turned on in a well defined sequence, thus spreading the in-rush current transients over time.

The IO's of X-GOLD TM 215 are isolated in OFF mode (core supply is off). The isolation signal is controlled by the PMU state machine. This ensures that the PADs are in a well defined state during core supply settling. This allows to power up the LCORE core regulator and wait for the core to reach reset state before powering up the I/O supply regulators.

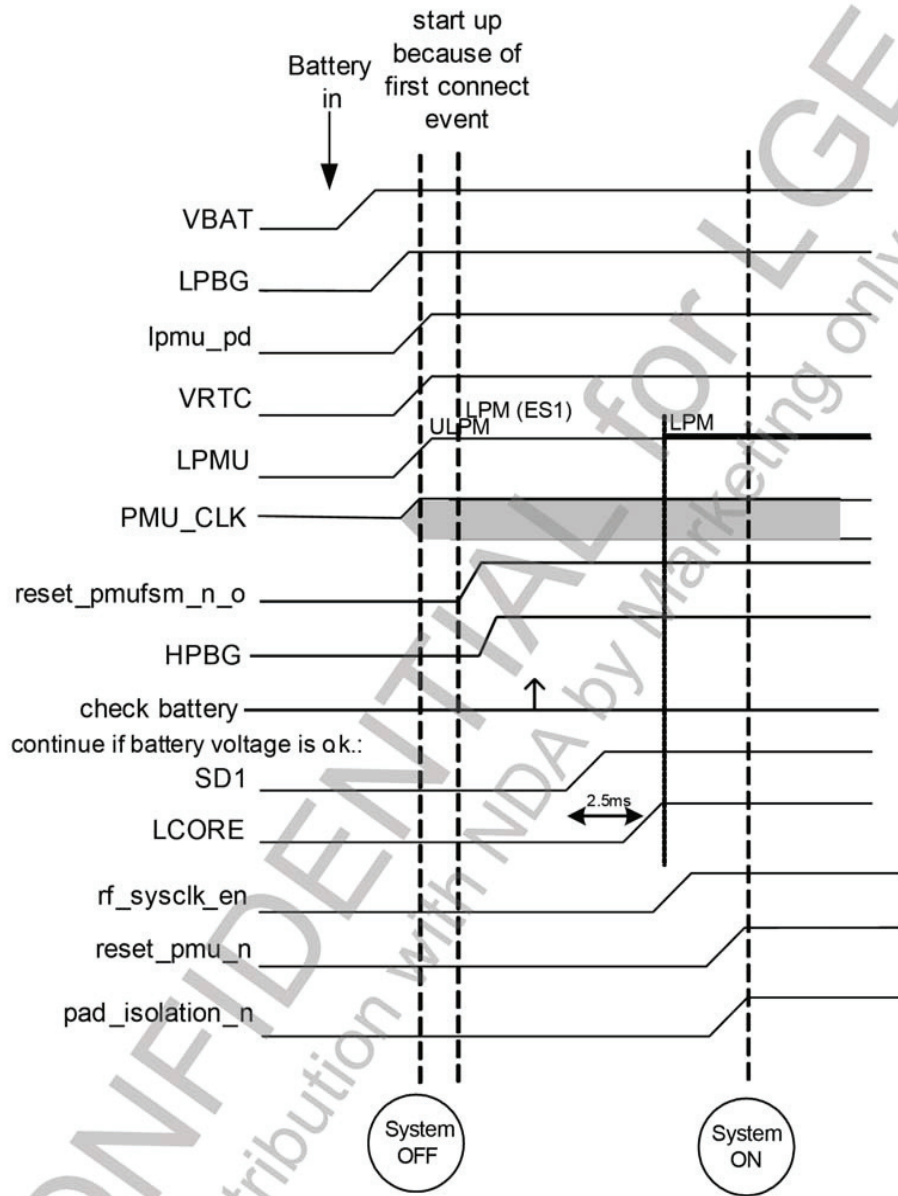


Figure 3.2.3 Start Up Sequence (triggered by First Connect Event)

3.2.7 External Reset Handling

The chip reset can be controlled by an external RESET_N ball. If this ball is pulled low, the chip will be reset.

All PMU registers are reset during the external reset including LSIM control bits. The PMU statemachines are also not reset from the external reset. An SW or watchdog reset will not reset the PMU registers.

A SW and Watchdog reset is seen on the reset_n pad to allow the reset of external devices. Basically there are three reset sources, first the reset signal controlled by the PMU (reset_pmu_n_o), second the reset signal controlled by the SCU (resetout_o) and third the external reset (RESET_N). The SCU reset is triggered by SW (for example due to a SW reset or watchdog reset). The PMU reset is controlled by the PMU state machine.

The output of the reset handling block is the reset_postscu_n_o signal. This signal controls for example the μ C subsystem and releases reset for the controller. During normal start up, the PMU releases the reset_pmu_n_o signal after entering the SYSTEM ON state. At this time the resetout_o signal is high, the RESET_N pad is not pulled low and therefore the reset_postscu_n_o signal follows the reset_pmu_n_o signal. That means the μ C reset will be released and the μ C starts operation. If the SW triggers an external reset via the SCU, signal resetout_o will be forced to low for a certain time and RESET_N will be forced to low by the open drain driver. At the same time the feedback to the SCU will be masked to not reset the baseband.

The RESET_N pad is in the VDDRTC domain but the internal pull up is connected to the VDD_VDIG1 (1.8V) domain. That allows the pad to be used as reset for external devices running in the VDD1V8 domain. The RESET_N pad can also be used to monitor the chip internal reset condition during startup.

The open drain driver is a weak driver, that means it can be forced to high during debug from external pushing some current into the pad. In testmode signal reset_pmu_n_o is high, that means the chip reset is fully controlled from external

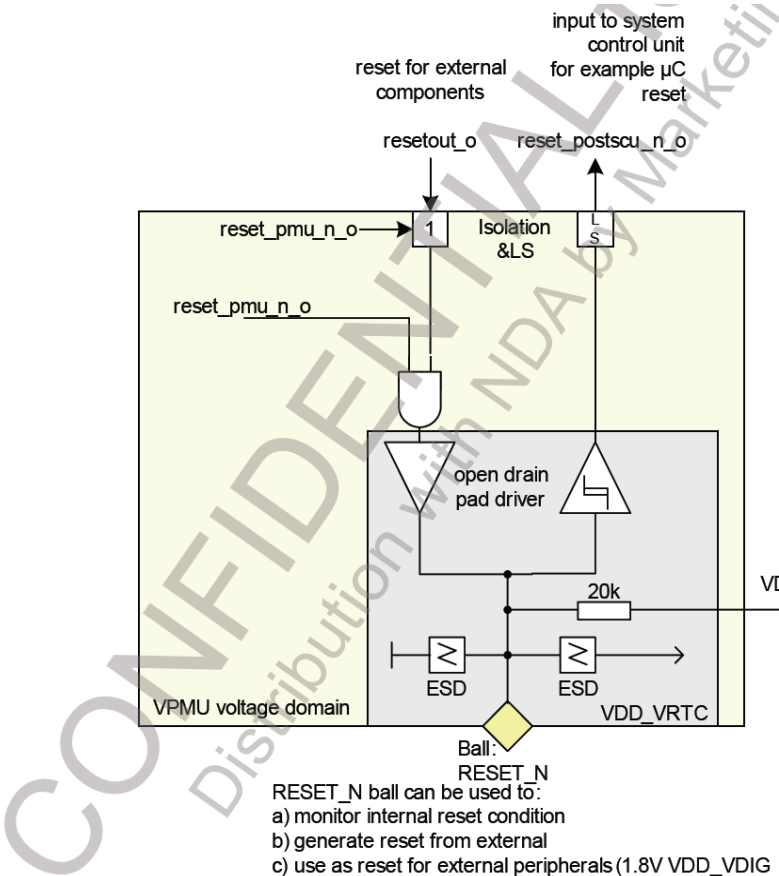


Figure 3.2.4 PMU, CGU and External Reset

3.2.8 Sysclock Switching

The PMU controls the `rf_sysclk_en` signal of the DCXO in the RF macro. During startup the PMU enables the DCXO. After the system is running the DCXO is controlled by the SCU of the baseband by using the `vcxo_enable` signal. This is handled by a dedicated logic in the PMU, see **Figure 21**. As long as `rf_sysclk_en_pmu`, the output of the PMU state-machine is high, `vcxo_enable` controls the `rf_sysclk_en` signal to the RF. If `rf_sysclk_en_pmu` is low, the DCXO is switched off, independent from `vcxo_enable`.

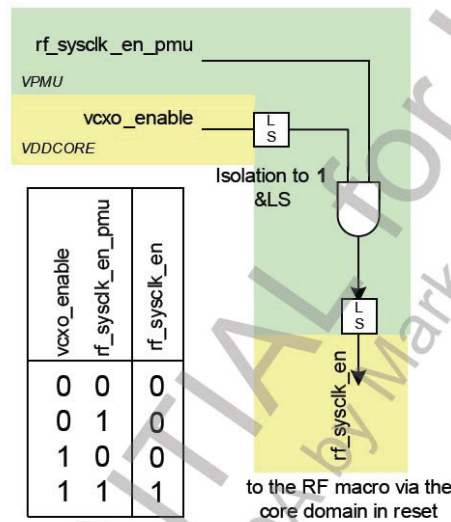


Figure 3.4.2 How sysclock Enable is Routed in the PMU

3.2.9 Undervoltage Shutdown

In active mode the PMU periodically measures the battery voltage using the ADC from the charger unit. If the battery is measured to be below the programmable shut-down level (called SYSOFF), the system changes to OFF mode. This is done via the SHUTDOWN state of the PMU state machine. (see chapter switch OFF)

3.2.10 Software Reset

A software reset does not affect any PMU register. The PMU register are reset with the `reset_pmufsm_n_o` signal. That means all PMU register are reset in OFF state. For details about the SW reset see chapter **External Reset Handling**.

3.2.11 PMU Clock

During the first startup (for example plugging in a battery) a PMU internal oscillator is used for generation of the PMU clock (`pmu_clock`). The frequency is slightly above 32 kHz (typ. 50 kHz) to be out of the audio band also for worst case devices. After first startup the software shall enable the 32 kHz crystal oscillator. It is not possible to use the 32 kHz oscillator during first startup, because the settling time of the oscillator can be quite long. After the 32 kHz oscillator is running and settled the software shall switch the PMU clock to the 32 kHz clock and disable the internal PMU oscillator for power saving reasons. The 32 kHz oscillator shall never be disabled after the PMU clock has been switched. The ADC in the charger unit has it's own oscillator generating a frequency of about 10 MHz. This oscillator is running during charging and during battery measurements triggered by the PMU. It is off otherwise.

3.2.12 System Sleep Mode

The sleep mode is controlled by using the VCXO_enable signal. This signal is used to switch the LDO's and the DC/DC converter SD1 in a programmable way into its low power mode (PFM). In addition DC/DC converter SD1 can be configured to change the output voltage to a lower value for additional power saving.

VCXO_enable is also used to deactivate the HPBG and setting LDO LPMU in the ultra-low-power mode. In addition the DCXO is switched off by the VCXO_enable signal. The VCXO_enable signal is also used to switch some LDO's (software configured) to sleep and/or off mode or to change the output voltages of said LDO's. The state of the main PMU state machine is not changed due to VCXO_enable.

3.2.13 DC/DC Pre-Load Register Handling

The DC/DC converter works in different modes. If the mode is switched from PFM to PWM the pulse-width of the DC/DC converter depends on the current battery voltage (and on the output voltage). The PMU state-machine knows the battery voltage because of the battery supervision function. Depending on this value it selects a startup pulse-width for the DC/DC converter out of a register table. (4-values)

3.2.14 Power Down Sequence

Setting bit OFF in the GeneralControl register switches the system into OFF mode. After the turn off event, the state-machine switches to the SHUTDOWN state. The reset_pmu_n_o signal changes to low, the I/O pads are isolated using the padisolation_n signal, the LCORE LDO and the SD1 DC/DC converter are switched off, the LPMU LDO is switched to ultra-low power mode, the DCXO is turned off and the bandgap buffer is disabled. Before switching OFF the software shall have enabled the 32 kHz oscillator and has switched the PMU clock to the 32 kHz clock to archive the target OFF current .

3.3 FEM with integrated Power Amplifier Module (RF7171, U101)

3.3.1 Internal Block Diagram

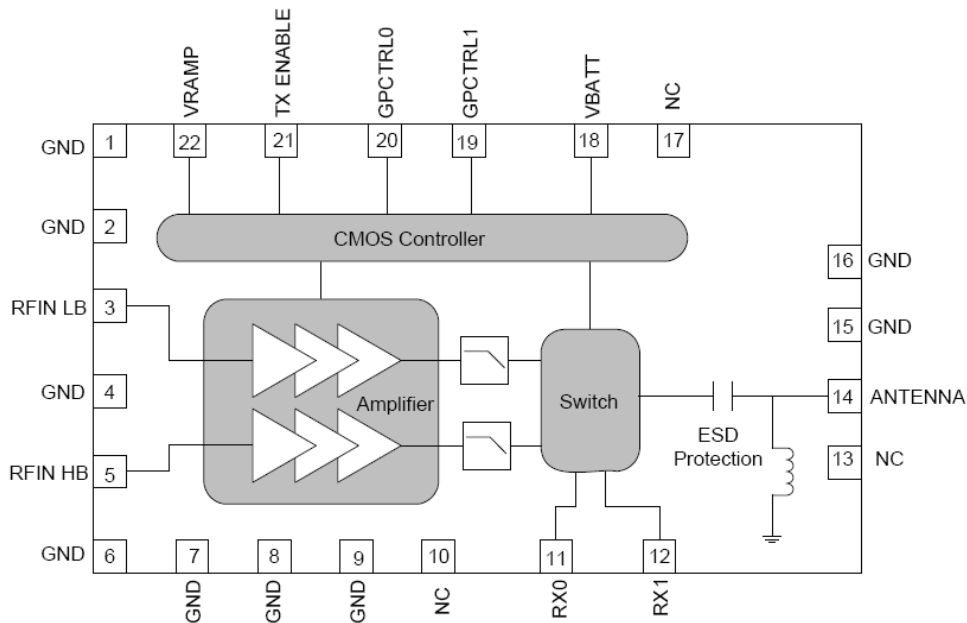


Figure. 3-3-1 RF7171 FUNCTIONAL BLOCK DIAGRAM

3.3.2 General Description

The RF7171 is a quad-band (GSM850/EGSM900/DCS1800/PCS1900) GSM/GPRS, Class 12 compliant transmit module with two interchangeable receive ports. This transmit module builds upon RFMD's power amplifier with PowerStar® integrated power control technology, pHEMT switch technology, and integrated transmit filtering for best-in-class harmonic performance.

The device is designed for use as the final portion of the transmitter section in a GSM850/EGSM900/DCS1800/PCS1900 handset and eliminates the need for a PA-to-antenna switch module matching network.

The RF7171 features RFMD's latest integrated power-flattening circuit which significantly reduces current and power variation into load mismatch. Additionally, a VBATT tracking feature is incorporated to maintain switching performance as supply voltage decreases.

The RF7171 also integrates an ESD filter to provide ESD protection at the antenna port.

The RF7171 is designed to provide maximum efficiency at rated Pout.

TX ENABLE	GpCtrl1	GpCtrl0	TX Module Mode
0	0	0	Low Power Mode (Standby)
0	1	0	RX0
0	1	1	RX1
1	1	0	GSM850/900 TX Mode
1	1	1	DCS1800/PCS1900 TX Mode

Figure 3.3.2 Band SW Logic Table

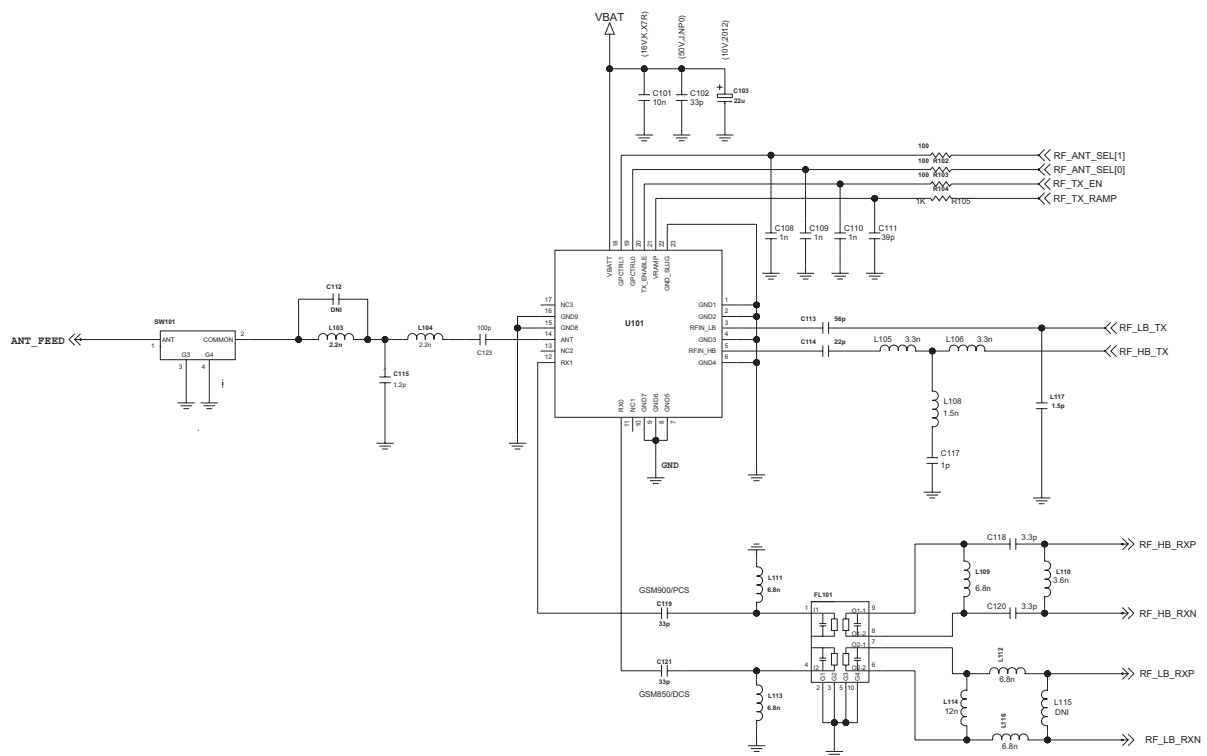
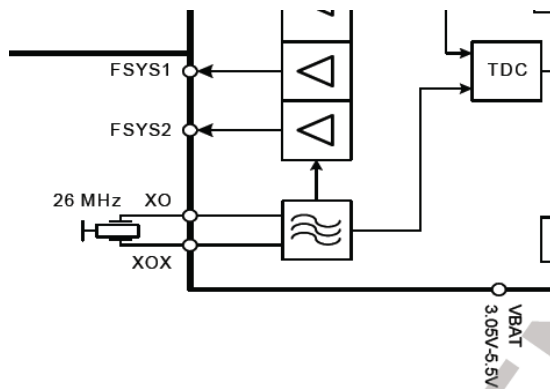


Figure 3.3.3 FEM CIRCUIT DIAGRAM

3.4 Crystal(26 MHz, X201)



The X-GOLDTM215 RF-Subsystem contains a fully integrated 26 MHz digitally controlled crystal oscillator, designed for 8 pF crystals. The only external part of the oscillator is the crystal itself. Overall pulling range of the DCXO is approximately ± 55 ppm, controllable by a 13-bit tuning word.

This frequency serves as comparison frequency within the RF-PLL and as clock frequency for the digital circuitry.

The 26 MHz reference clock can also be applied to external components like Bluetooth or GPS, via the two buffered output signals FSYS1 and FSYS2

Figure. 3.4.1 Crystal Oscillator External Connection

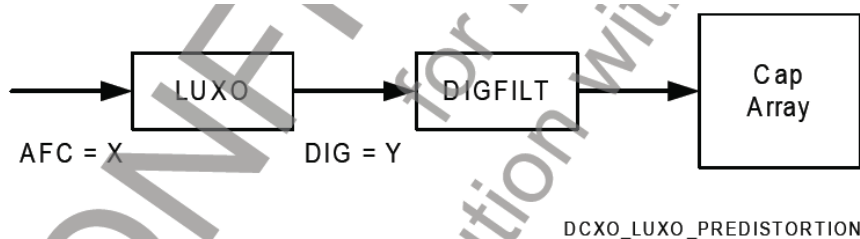


Figure. 3.4.2 Digital PREDISTORTION with LUXO

The DCXO tuning characteristic should be a first order linear function of the programming word AFC. The variable capacitance array is a first order linear function of the digital word DIG, which leads to a nonlinear curve ppm vs. DIG (and also a nonlinear ppm vs. AFC for DIG=AFC). In order to linearize the ppm vs. AFC curve the implementation of a predistortion is necessary.

To get the wanted linear ppm vs. AFC tuning curve some digital predistortion of the AFC word is required. This predistortion is performed by the linearization unit for crystal oscillator (LUXO). The LUXO calculates the corresponding DIG value according to the given AFC value.

3.5 RF Subsystem of PMB8815 (U201)

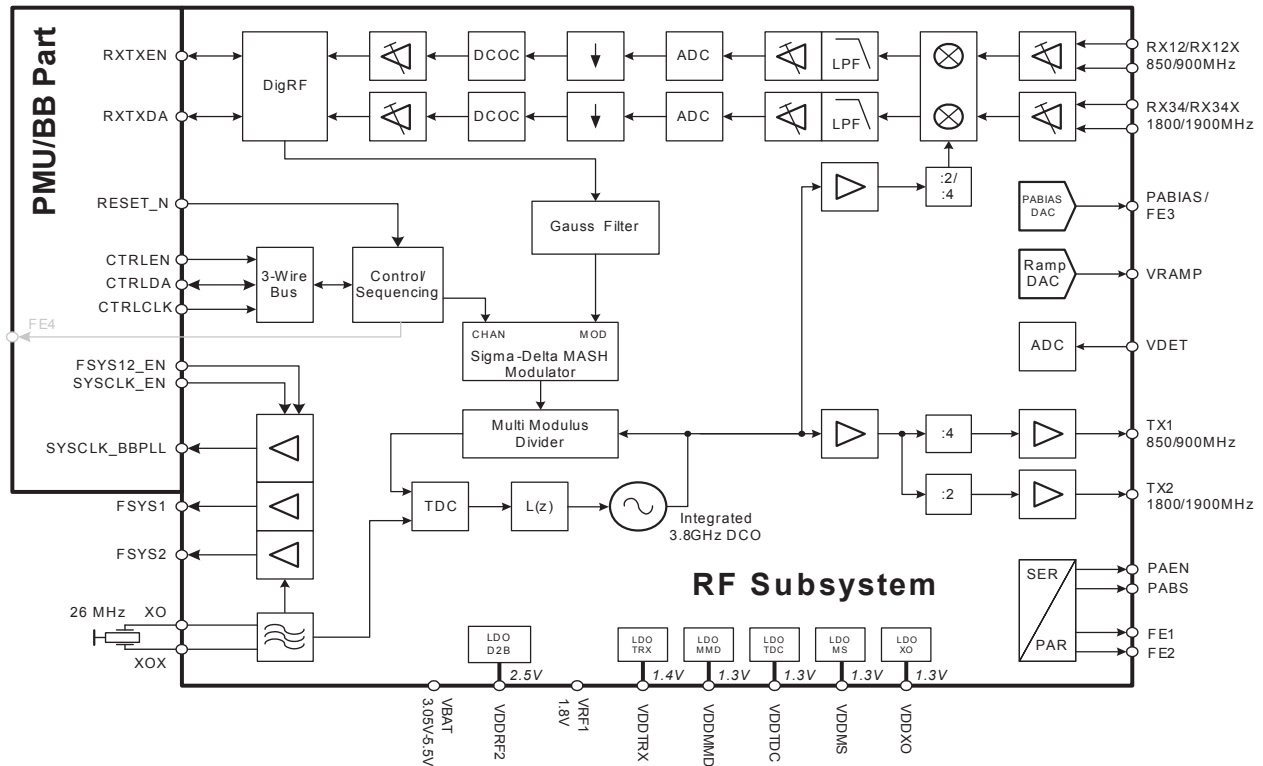


Figure 3-5-1 Block DIAGRAM of RF Subsystem

3.5.1 GENERAL DESCRIPTION

The PMB8815 RF subsystem is designed for dual-band GSM voice and data applications (GPRS class 12). The system can be configured to support one low band, GSM850 or EGSM900, and one high band, DCS1800 or PCS1900. A block diagram of the RF subsystem is given in Figure 3-4-1.

3.5.2 FUNCTIONAL DESCRIPTION

3.5.2.1 Receiver

The X-GOLD™215 dual-band receiver is based on a Direct Conversion Receiver (DCR) architecture. Input impedance of the LNAs is optimized to achieve a matching without (external) high quality inductors. By use of frequency dividers (by 2/4) the LO frequency is derived from the RF frequency synthesizer.

The receive path is fully differential to suppress the on-chip interferences and reduce DC-offsets. The analog chain of the receiver contains two LNAs (low/high band), a quadrature mixer followed by an analog baseband filter and 14-bit continuous-time delta-sigma analog-to-digital converter. The filtered and digitized signal is fed into the digital signal processing chain, which provides decimation, DC offset removal and programmable gain control.

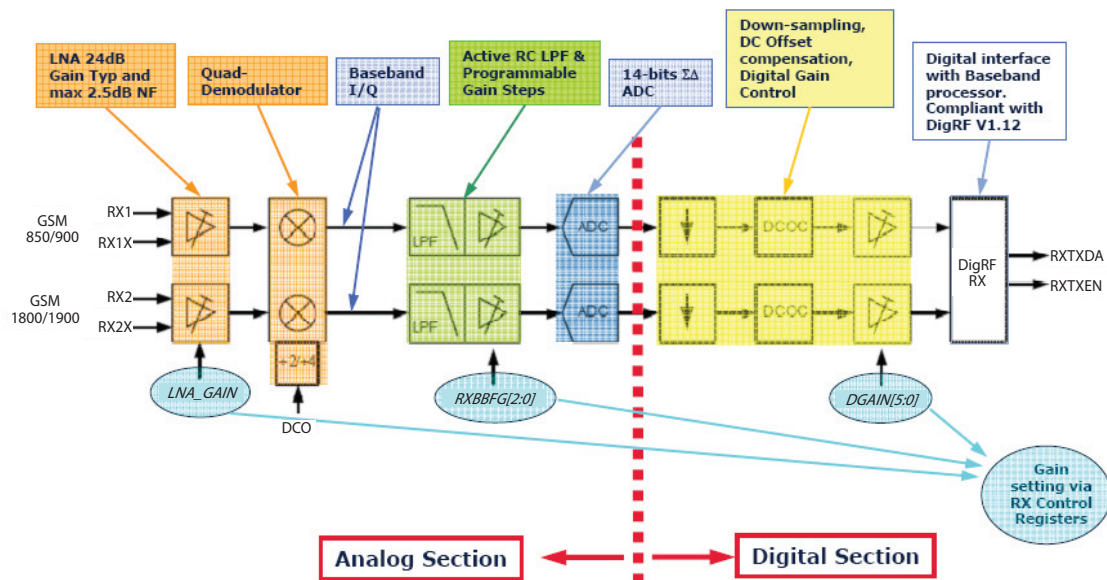


Figure. 3.5.2 RECEIVER CHAIN BLOCK DIAGRAM

3.5.2.2 Transmitter

The GMSK transmitter supports power class 4 for GSM850 or GSM900 as well as power class 1 for DCS1800 or PCS1900. The digital transmitter architecture is based on a fractional-N sigma-delta synthesizer for constant envelope GMSK modulation. This configuration allows a very low power design without any external components.

Up- and down-ramping is performed via the ramping DAC connected to VRAMP.

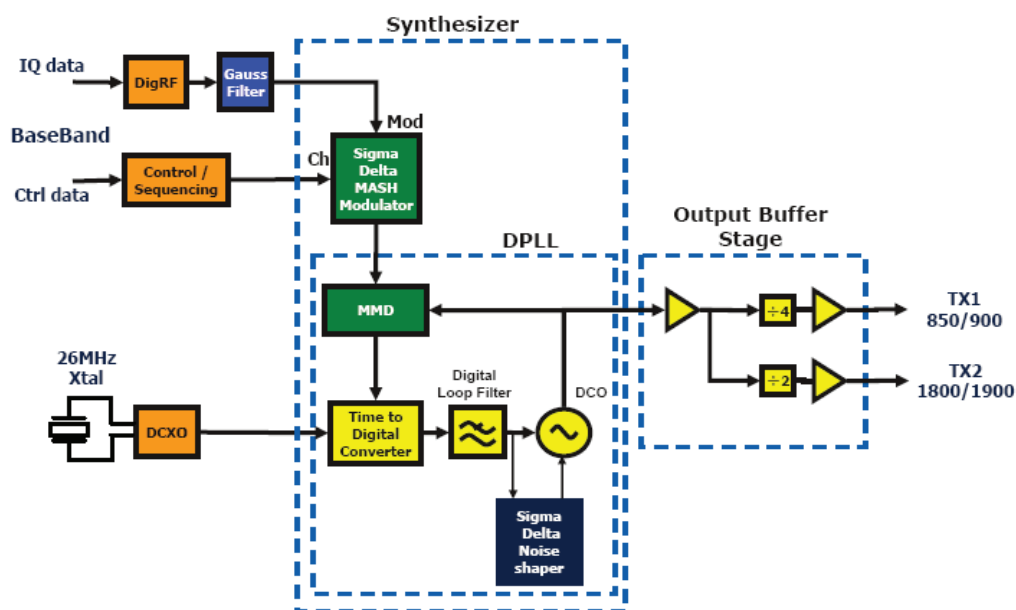


Figure. 3.5.3 TRANSMITTER CHAIN BLOCK DIAGRAM

RF synthesizer

The RF subsystem contains a fractional-N sigma-delta synthesizer for the frequency synthesis. Respective to the chosen band of operation the phase locked loop (PLL) operates at twice or forth of the target signal frequency. In receive operation mode the divided output signal of the digital controlled oscillator output (DCO) serves as local oscillator signal for the balanced mixer. For transmit operation the fractional-N sigma-delta synthesizer is used as modulation loop to process the phase/frequency signal. The 26 MHz reference signal of the phase detector incorporated in the PLL is provided by the reference oscillator.

3.5.2.3 Front-end/PA Control Interface

Two outputs (FE1, FE2) for direct control of antenna switch modules enable to select RX- and TX-mode as well as low- and high-band operation.

An extra band select signal PABS for the power amplifier is used, to support discrete PA and switching modules. Time accurate power dissipation of the PA is achieved by the control signal PAEN.

A minor set of power amplifiers require a bias voltage to enhance power efficiency. Support of this power amplifiers is achieved by the implemented bias DAC.

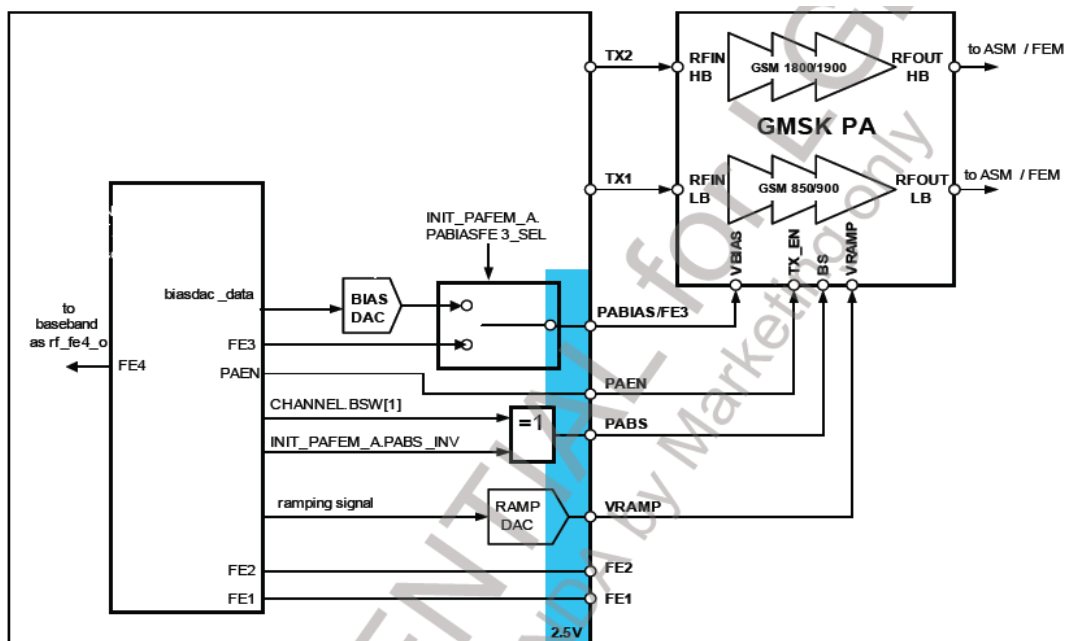


Figure. 3.5.4 PA AND FEM CONTROL BLOCK DIAGRAM

3.5.2.4 Power Supply

To increase power efficiency most parts of the RF subsystem are supplied by the DCDC converter situated in the PMU subsystem. Conversion of the 1.8 V output voltage of the DCDC to the 1.3 V/1.4 V circuit supply voltages is achieved by several Low-DropOut regulators (LDO).

One embedded direct-to-battery LDO provides the 2.5 V supply voltage for the remaining circuits.

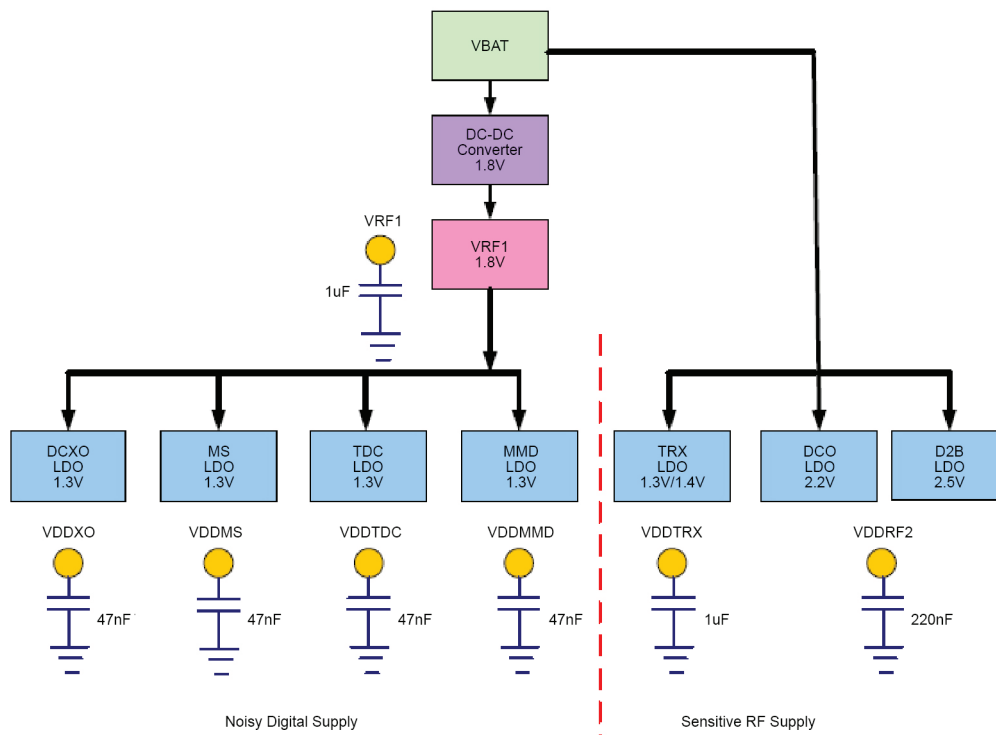


Figure. 3.5.5 POWER SUPPLY BLOCK DIAGRAM

3.6 MEMORY(H9DA2GH1GHMMMR, U301)

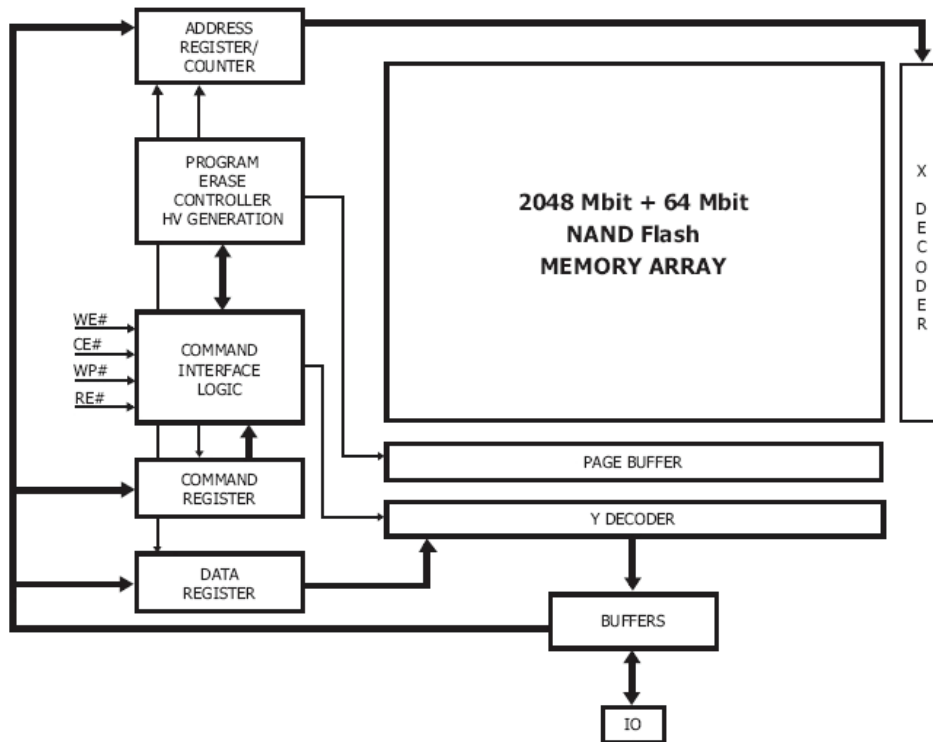


Figure. 3.6.1 MEMORY BLOCK DIAGRAM

Hynix NAND Flash is a 128Mx16bit with spare 4Mx16 bit capacity.

The device is offered in 1.8 Vcc Power Supply, and with x16 I/O interface.

Its NAND cell provides the most cost-effective solution for the solid state mass storage market.

The memory is divided into blocks that can be erased independently so it is possible to preserve valid data while old data is erased.

The device contains 2048 blocks, composed by 64 pages.

Memory array is split into 2 planes, each of them consisting of 1024 blocks.

Like all other 2KB - page NAND Flash devices, a program operation allows to write the 2112-byte page in typical 250us and an erase operation can be performed in typical 3.5ms on a 128K-byte block.

In addition to this, thanks to multi-plane architecture, it is possible to program 2 pages at a time (one per each plane) or to erase 2 blocks at a time (again, one per each plane). As a consequence, multi-plane architecture allows program time to be reduced by 40% and erase time to be reduction by 50%. In case of multi-plane operation, there is small degradation at 1.8V application in terms of program/erase time..

[NAND Flash]

- MULTIPLANE ARCHITECTURE
- SUPPLY VOLTAGE
 - $V_{CC} = 1.7 - 1.95 \text{ V}$
- MEMORY CELL ARRAY
 - (1K + 32) Words x 64 pages x 2048 blocks
- PAGE SIZE
 - (1K+ 32 spare) Words
- BLOCK SIZE
 - (64K + 2K spare) Words
- PAGE READ / PROGRAM
 - Random access : 25us (max.)
 - Sequential access : 45ns (min.)
 - Page program time : 250us (typ.)
 - Multi-page program time (2 pages): 250us (Typ.)
- BLOCK ERASE / MULTIPLE BLOCK ERASE
 - Block erase time: 3.5 ms (Typ)
 - Multi-block erase time (2 blocks): 3.5ms (Typ.)
- SECURITY
 - OTP area
 - Serial number (unique ID)
 - Hardware program/erase disabled during power transition
- ADDITIONAL FEATURE
 - Multiplane Architecture:
Array is split into two independent planes.
Parallel operations on both planes are available, having program and erase time.
 - Single and multiplane copy back program with auto matic EDC (error detection code)
 - Single and multiplane page re-program
 - Single and multiplane cache program
 - Cache read
 - Multiplane block erase
- RELIABILITY
 - 100,000 Program / Erase cycles (with 1bit /528Byte ECC)
 - 10 Year Data retention
- ONFI 1.0 COMPLIANT COMMAND SET ELECTRICAL SIGNATURE
 - Manufacture ID: ADh
 - Device ID

[DDR SDRAM]

- Double Data Rate architecture
 - two data transfer per clock cycle
- x16 bus width
- Supply Voltage
 - VDD / VDDQ = 1.7 - 1.95 V
- Memory Cell Array
 - 16Mb x 4Bank x 16 I/O
- Bidirectional data strobe (DQS)
- Input data mask signal (DQM)
- Input Clock
 - Differential Clock Inputs (CK, /CK)
- MRS, EMRS
 - JEDEC Standard guaranteed
- CAS Latency
 - Programmable CAS latency 2 or 3 supported
- Burst Length
 - Programmable burst length 2 / 4 / 8 with both sequential and interleave mode

3.7 BT module

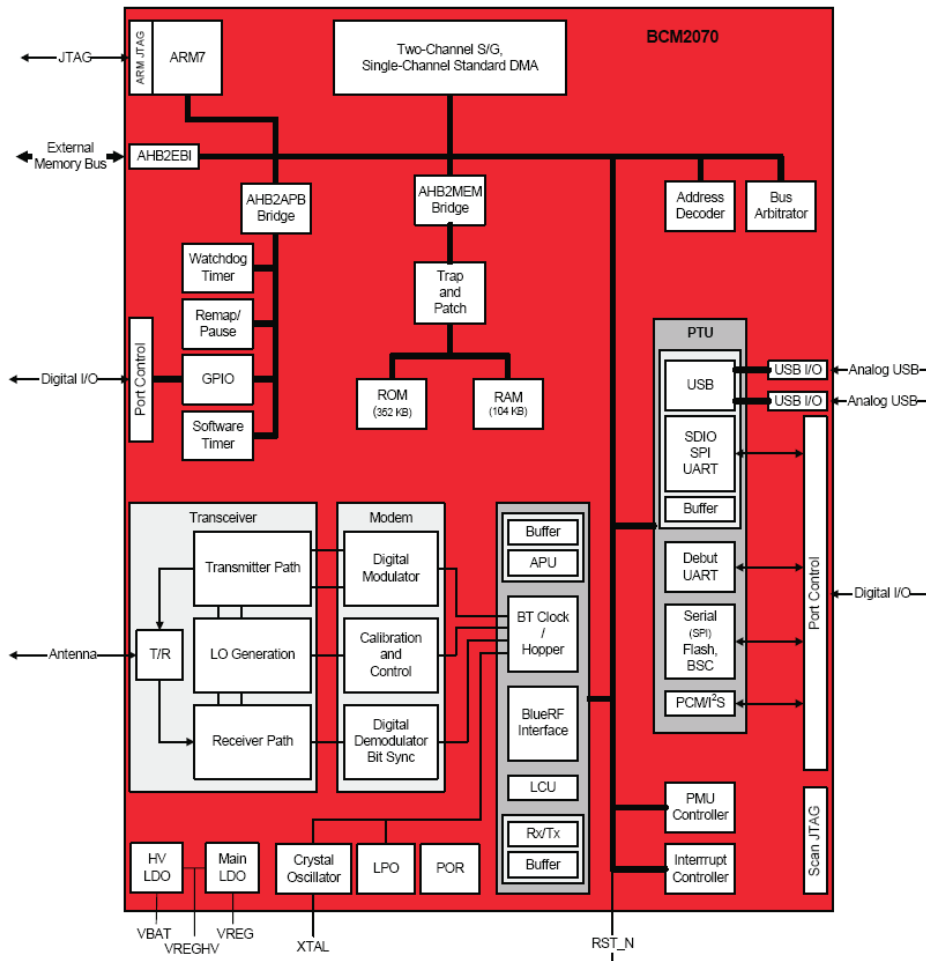


Figure 3_7_1. BT BLOCK DIAGRAM

This module has an integrated radio transceiver that has been optimized for use in 2.4GHz Bluetooth Wireless systems. It has been designed to provide low-power, robust communications for applications Operating in the globally available 2.4GHz unlicensed ISM band. It is fully compliant with the Bluetooth Radio Specification and enhanced data rate specification and meets or exceed the requirement to provide the highest communication link quality of service.

3.7.1 Transmitter path

This module features a fully integrated zero IF transmitter. The baseband transmitted data is digitally modulated in the modem block and up-converted to the 2.4GHz ISM band in the Transmitter path. The transmitter path consists of signal filtering, I/Q up-conversion, high-output power amplifier(PA), and RF filtering. It also incorporates modulation schemes P/4-DQPSK for 2 Mbps and 8-DPSK for 3 Mbps to support enhanced data rate.

• Digital modulator

The digital modulator performs the data modulation and filtering required for the GFSK, $\pi/4$ DQPSK, and 8-DPSK signal. The fully digital modulator minimizes any frequency drift or anomalies in the modulation characteristics of the transmitted signal and is much more Stable than direct VCO modulation schemes.

• Power Amplifier

The integrated PA for the BCM2070 is configurable for Class 2 operation, transmitting up to +4 dBm as well as Class 1 operation and transmit power up to +12 dBm at the chip, gFSK, >2.5V supply. Due to the linear nature of the PA, combined with some integrated filtering, no External filters are required for meeting Bluetooth and regulatory harmonic and spurious requirements. For integrated mobile handset applications, where Bluetooth is integrated next to the cellular radio, minimal external filtering can be applied to achieve near thermal noise levels for spurious and radiated noise emissions.

Using a highly linearized, temperature compensated design the PA can transmit +12 dBm for Basic rate and +10 dBm for enhanced data rates(2 to 3 Mbps). A flexible supply voltage range Allows the PA to operate from 1.2V to 3.0V. The minimum supply voltage at VDDTF is 1.8V to achieve +10dBm of transmit power.

3.7.2 Receiver path

The receiver path uses a low IF scheme to down-convert the received signal for demodulation in the digital demodulator and bit synchronizer. The receiver path provides a high degree of Linearity, an extended dynamic range, and high order on-chip channel filtering to ensure reliable operation in the noisy 2.4GHz ISM band. The front-end topology, with built-in out-of-band attenuation, enables the device to be used in most applications with no off-chip Filtering.

For integrated handset operation where the Bluetooth function is integrated close to the cellular transmitter, minimal external filtering is required to eliminate the desensitization of the receiver by the cellular transmit signal.

3.8 SIM Card Interface

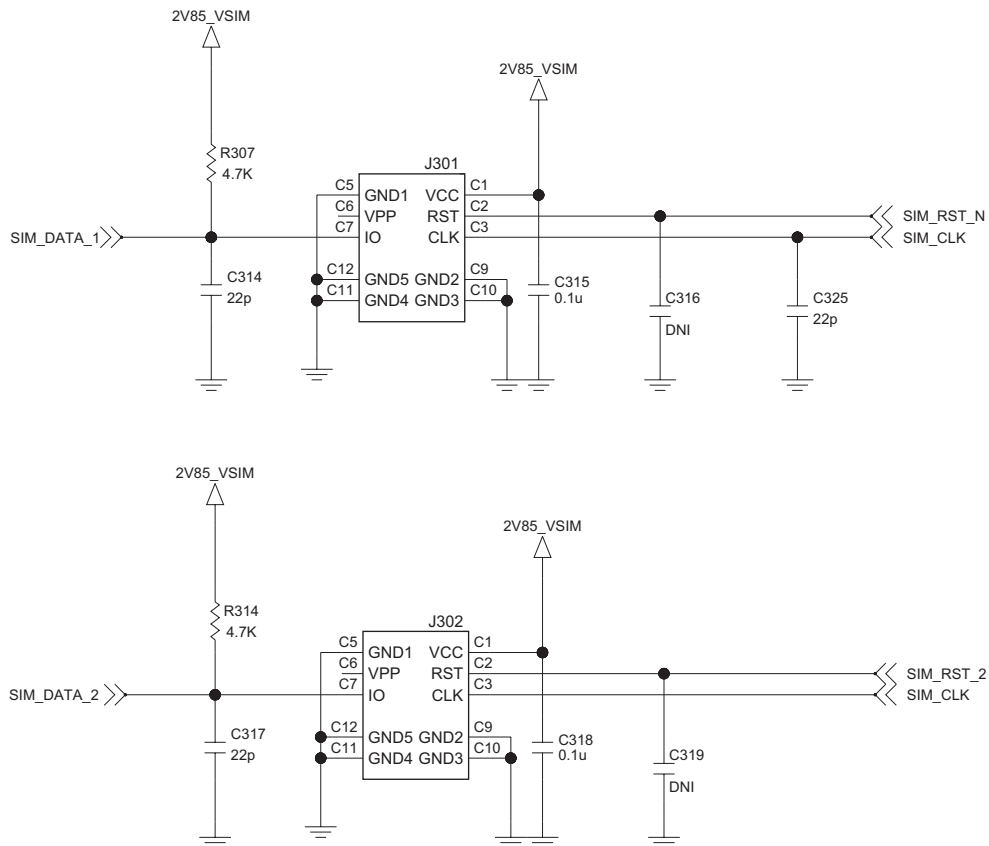


Figure 3-8-1. SIM CARD Interface

The Main Base Band Processor(XMM215) provides SIM Interface Module.

The XMM215 checks status Periodically During established call mode whether SIM card is inserted or not, but it doesn't check during deep sleep mode. In order to communicate with SIM card, 3 signals SIM_DATA, SIM_CLK, SIM_RST_N.

And This model supports 1.8/3V SIM Card.

Signal	Description
SIM_RST_N	This signal makes SIM card to HW default status.
SIM_CLK	This signal is transferred to SIM card.
SIM_DATA	This signal is interface datum.

3.9 LCD Interface

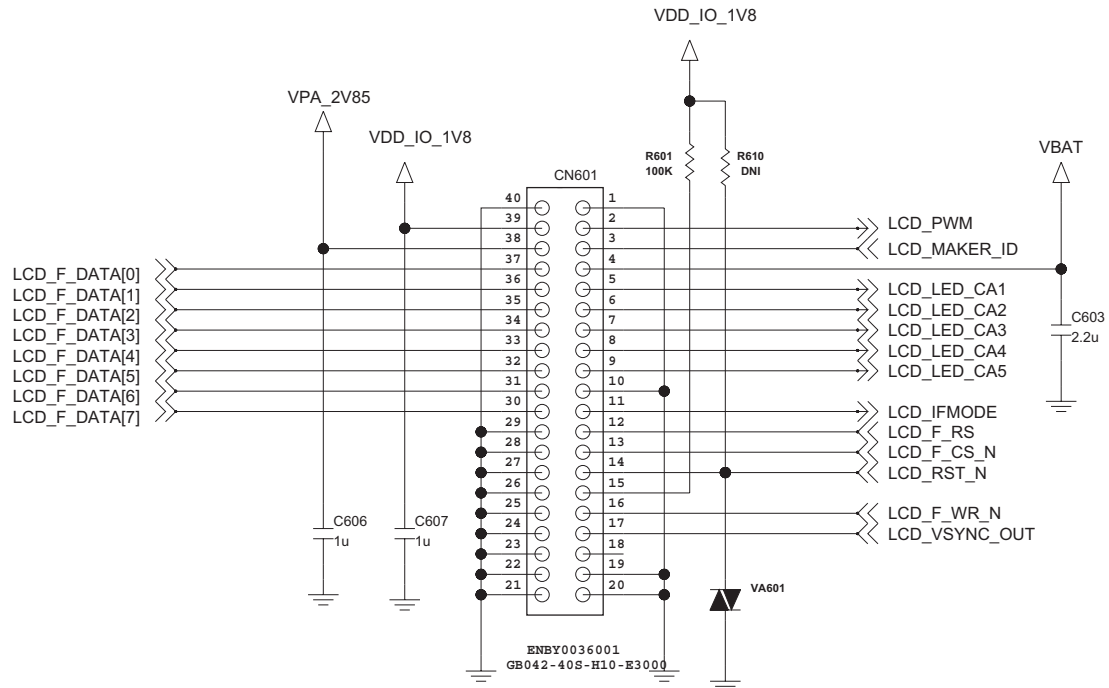


Figure 3-9-1. LCD Interface (B to B Connector on Main PCB)

The LM283DN2A module is a Color Active Matrix Liquid Crystal Display with an Light Emission Diode(LED) Back Light system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally Black mode. This TFT-LCD has a 2.83 inch diagonally measured active display area with 240 * RGB * 320 resolution. Each pixel is divided into R,G,B dots which are arranged in vertical stripes. Gray scale or the brightness of the dots Color is determined with a 6 bit gray scale signal for each dot, thus, presenting a palette of More than 262,144 colors.

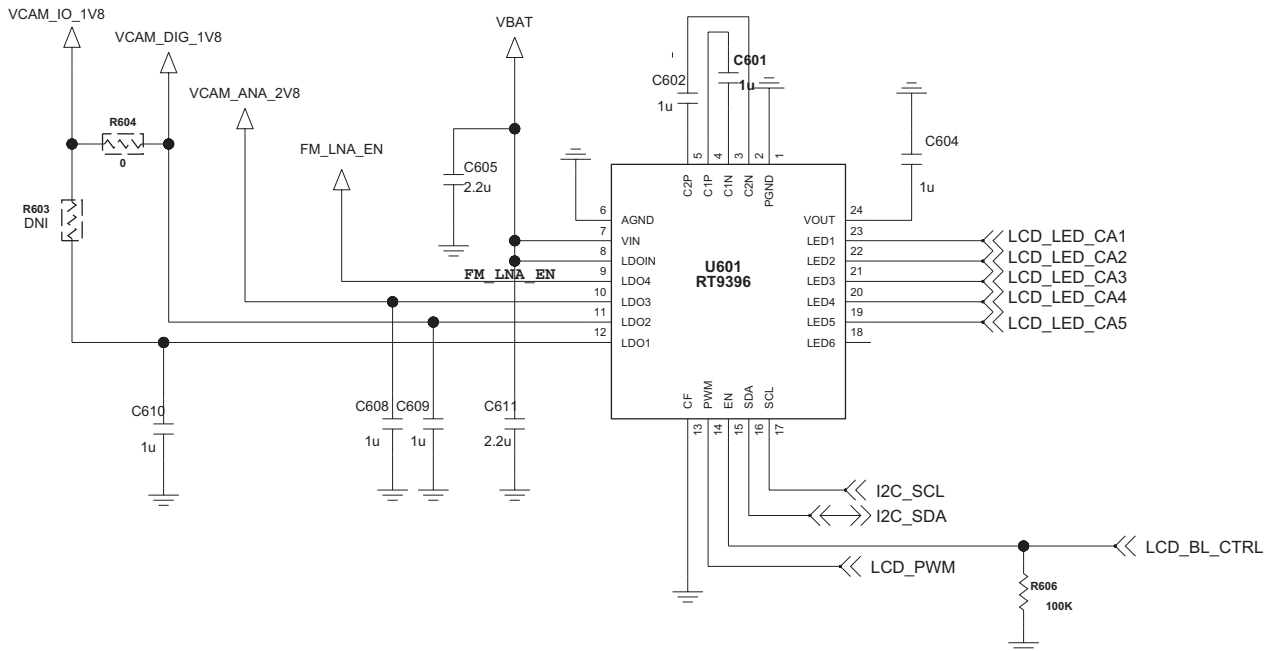


Figure 3-9-2. RT9396 CIRCUIT DIAGRAM

The RT9396 is a power management IC (PMIC) for backlighting and phone camera applications. The PMIC contains a 6-Channel charge pump white LED driver and four low dropout linear regulators. The charge pump drives up to 6 white LEDs with regulated constant current for uniform intensity. Each channel (LED1 to LED6) supports up to 25mA of current. These 6-Channels can be also programmed as 4 plus 2-Channels or 5 plus 1-Channels with different current setting for auxiliary LED application. The RT9396 maintains highest efficiency by utilizing a x1/ x1.5/ x2 fractional charge pump and low dropout current regulators. An internal 6-bit DAC is used for backlight brightness control. Users can easily configure up to 64-steps of LED current via the I2C interface control. The RT9396 also comprises low noise, low dropout regulators, which provide up to 200mA of current for each of the four channels. The four LDOs deliver 3% output accuracy and low dropout voltage of 200mV @ 200mA. Users can easily configure LDO output voltage via the I2C interface control. The LDOs also provide current limiting and over-temperature functions. The RT9396 is available in a WQFN-24L 3x3 package.

LED Backlight Current

RT9396 communicates with a host (master) Using the standard I2C 2-wire interface.

The two bus lines of SCL and SDA must be pulled high when the bus is not in use. Internal pull-up resistors are installed. After the START condition, the I2C master sends a chip address. This address is eight bits long, consisting of seven address bits and a following data direction bit (R/W).

The RT9396 address is 10101000 (A8h) and is a receive-only (slave) device. The second word selects the register to which the data will be written. The third word contains data to write to the selected register. Figure 2 shows the writing information for the four LDOs as well as for each LED current. In the second word, the sub-address of the four LDOs is "001" and the sub-address of the LED Driver for different dimming modes are respectively "010", "011" and "100". For the LDO output voltage setting, bits B1 to B4 represent each LDO channel respectively where a "1" indicates selected and a "0" means not selected.

The B0 bit controls on/off (1/0) mode for the selected LDO channel(s). Then, in the third word, bits C0 to C3 control a 16-step setting of LDO1 to LDO4. The voltage values are listed in Table 1. For LED dimming, there are three operating modes (Backlight I, Backlight II and Backlight III) to select from by writing respectively "010", "011" and "100" into the first three bits of the second word. It should be noticed that no matter which mode is selected, LED1 to LED3 must be turned on, else LED4 to LED6 can not be turned on.

When Backlight I is selected, all six LEDs have the same behavior. Their 64-step dimming currents are set by bits C0 to C5, which are listed in Table 2. The bits C6 and C7 determine the fade in/out time of each step as shown in Figure 2. For Backlight II and Backlight III, two sets of LEDs, called Main and Sub, can work separately.

Backlight Quiescent Current

The quiescent current required to operate all four backlights is reduced by 1.5mA when backlight current is set to 4.0mA or less. This feature results in higher efficiency under light-load conditions. Further reduction in quiescent current will result from using fewer than four LEDs.

3.10 MiniABB (Battery Charger & MUIC) Interface

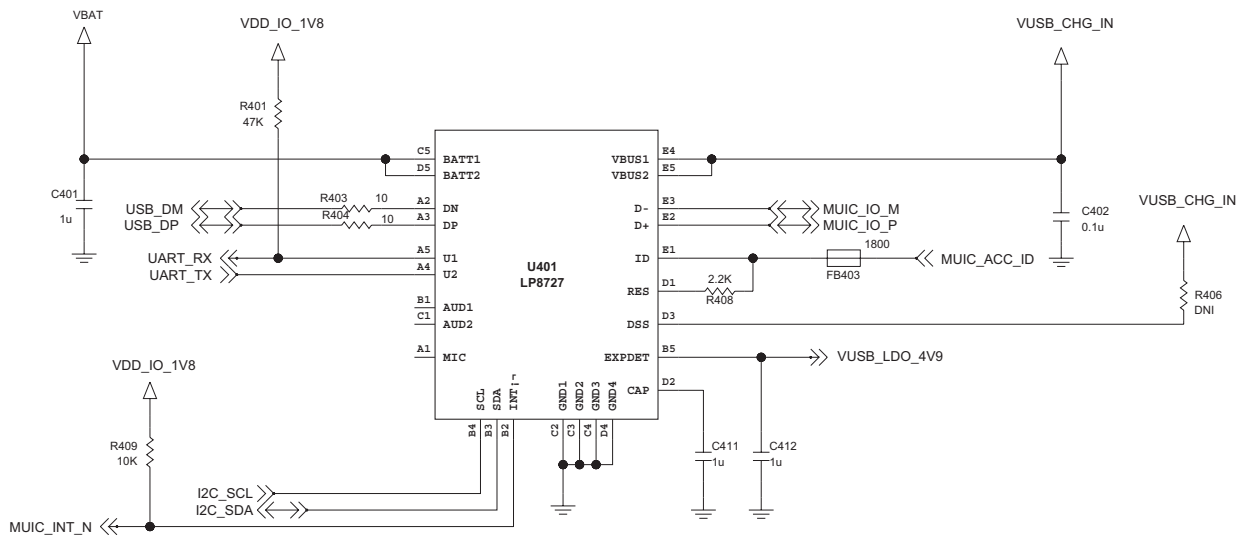


Figure 3-10-1 Mini ABB BLOCK

The LP8727 is designed to provide automatic multiplexing switches between Micro/Min USB connector and USB, UART, and Audio paths in cellular phone applications, and it also contains a single-input Li-ion battery charger and over-voltage protected LDO. Programming is handled via an I2C compatible Serial Interface allowing control of charger, multiplexing switches, and reading status information of the device.

The multiplexing switches on USB and UART support High-Speed USB and Audio inputs can be driven to negative voltage rail. The LP8727 is compatible with USB charging specification rev 1.1 from USB IF.

The Li-ion charger requires few external components and integrates the Power FET. Charging is thermally regulated to obtain the most efficient charging rate for a given ambient temperature. It has Over-Voltage Protection (OVP) circuit at the charger input protects the PMU from input voltage up to +28V, eliminating the need for an external protection circuitry.

An Over-voltage protected LDO which can supply up to 50mA is designed for powering up low voltage USB transceiver or waking up a PMU(Power Management Unit)when an external power source(either USB VBUS or wall adapter) is connected to the USB connector.

3.11 Keypad Interface

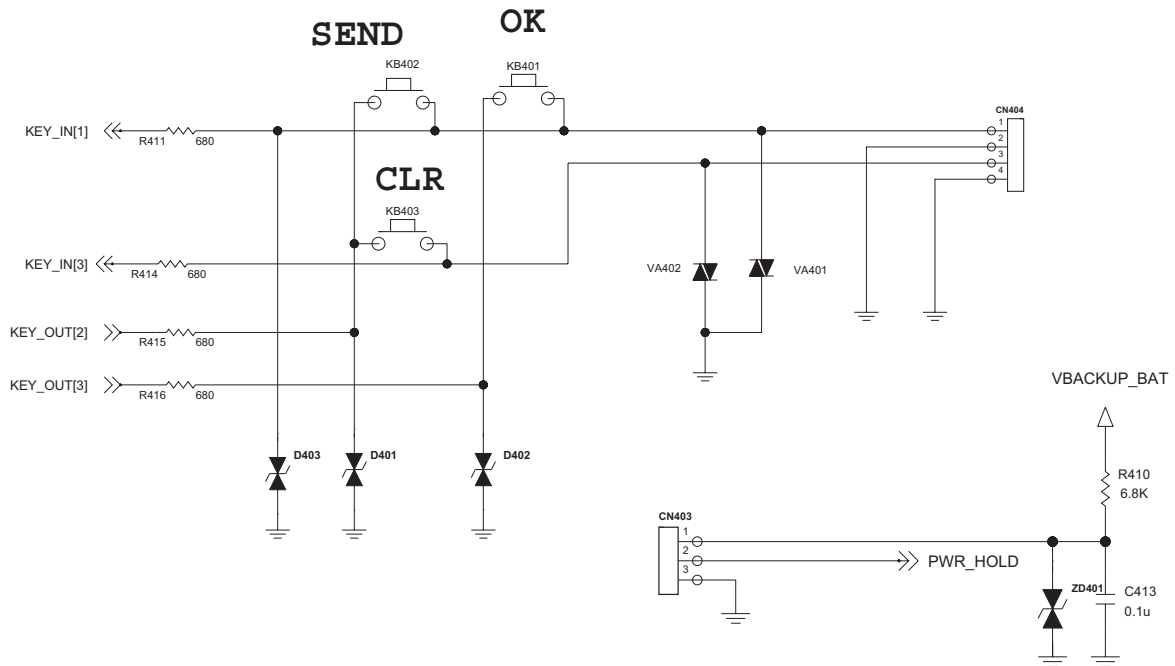


Figure 3-11-1 MAIN KEY STRUCTURE

The Keypad Interface is a peripheral controller, which can be used for scanning external keypad matrices with up to 8 rows and 8 columns (that is 64 standard keys). By adding an additional row of keys connected to ground the number of keys can be extended by up to 8 keys. This results in a maximum number of 72 keys to be identified by the Keypad Interface Controller.

The Keypad Scan Module reduces the number of interrupts and polling through the processor and therefore reduces the power consumption. The module is able to debounce and scan the external keypad matrix automatically without any software intervention. After debouncing it generates an interrupt. The interface controller contains information about the key (or key combination) that was pressed and how long it was pressed.

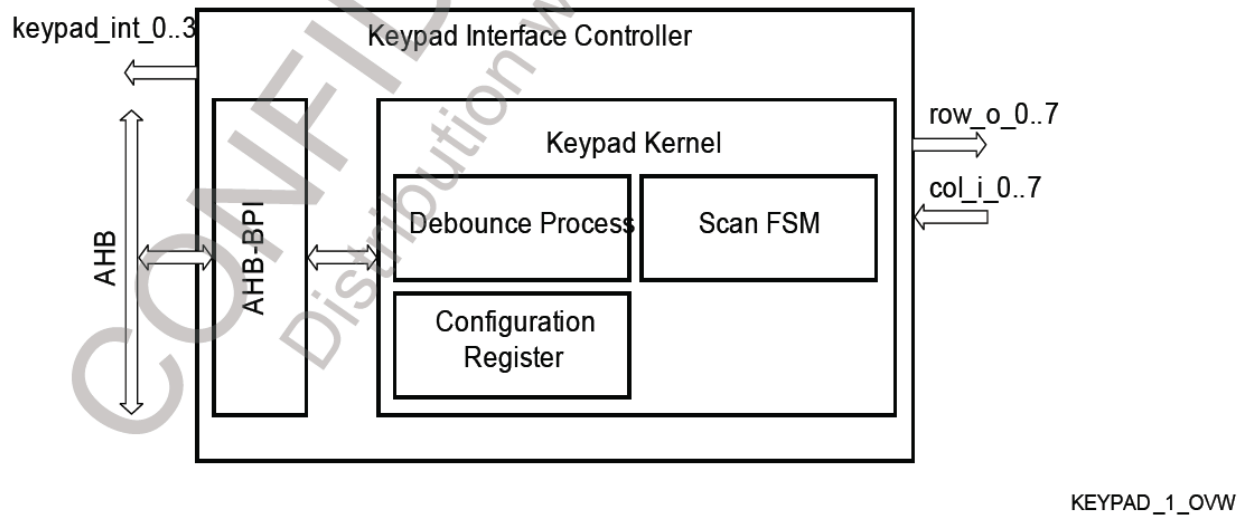


Figure 3-11-3 Block Diagram and System Integration of the KPD

3.12 Audio Interface

3.12.1 Functional Overview

The audio front-end of X-GOLD™215 offers the digital and analog circuit blocks for both receive and transmit audio operation, from a mobile phone perspective (called audio-in and audio-out subsequently). It features a high-quality, stereo digital-to-analog path with amplifier stages for connecting acoustic transducers to X-GOLD™215. In audio-in path the supply voltage generation for electret microphones, a low-noise amplifier and analog to digital conversion are integrated in X-GOLD™215. A more detailed functional description will be given in the following sections.

The audio front-end itself can be considered to be organized in three sub-blocks:

- Interface to processor cores (TEAKLite® and - indirectly - ARM)
- Digital filters
- Analog part

The following figure shows an architecture overview of the Audio section.

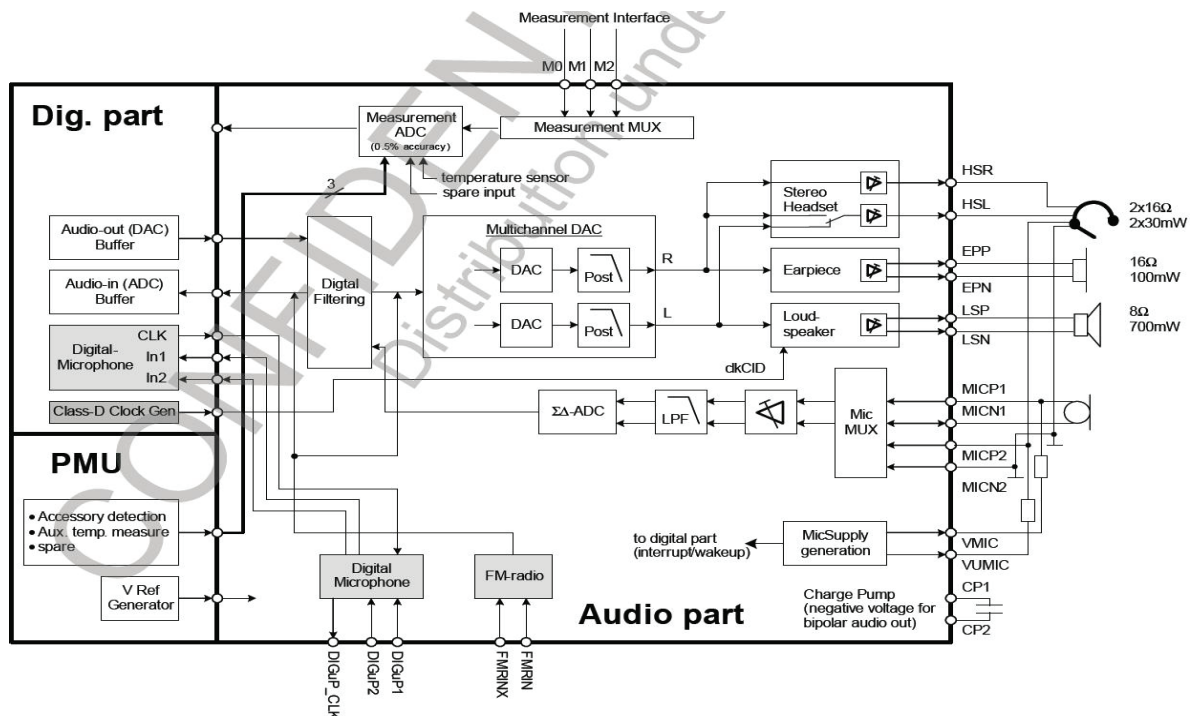


Figure 3.12.1 Audio Section Overview

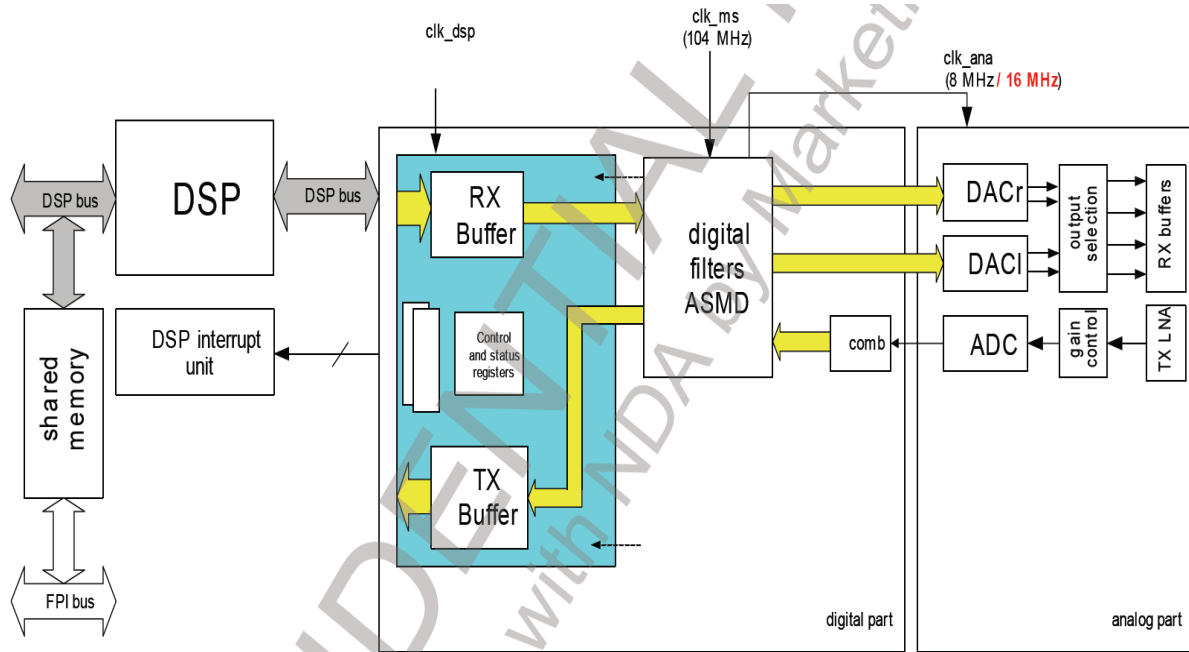


Figure 3.12.2 Overview of Clocking and Interfaces of Audio Front End

The audio front-end of X-GOLD™215 has the following major operation modes:

- Power-down: All analog parts are in power down and all clocks of the digital part are switched off.
- Audio mode: Digital decimation/interpolation filters are connected to the interface buffers and the analog part is enabled.

These major modes can be modified by certain control register settings.

- Due to the new gain settings in the TX path, the maximum input voltage is limited to 0.8 Vpp.
- In both voiceband paths, the value range for voice samples is confined to 97.5%, i.e. to [-31948, 31947] or [8334H, 7CCBH] in X-GOLD™215.
- On the TX path, 83% "1"s on the VTPDM line correspond to a 16-bit value of 7CCBH and 17% "1"s correspond to a 16-bit value of 8334H at the digital filter output. Thus the usable range is 66%. This range can be scaled to 100% by Firmware.
- The high-pass functions of the voiceband filters have to be implemented in firmware on TEAKLite®.

3.12.2 Digital Part

The digital part of the X-GOLD™215 audio front-end comprises an interface to the TEAKLite® bus, interfaces to the interrupt units of TEAKLite®, digital interpolation filters for oversampling digital-to-analog conversion, digital decimation filters for analog-to-digital conversion and an interface to the analog part of the audio front-end. For the digital microphone all the filtering is done in a dedicated hardware. The output sample stream is then fed in a duplicated ring buffer structure like the data from the analog microphone path (after A/D conversion and subsequent digital filtering).

▪ Interpolation Filter

The interpolation path of the X-GOLD™215 audio front-end increases the sampling rate of the audio samples to the rate of the digital-to-analog converter. Because the input sampling rates can vary between 8 kHz and 47.619 kHz the filter characteristic and oversampling ratio can be adjusted to the respective sampling rate. The requirements for the interpolation filters depend on the sampling rate, because a sufficient out-of-band discrimination in the audio frequency band (20 Hz,...,20 kHz) has to be ensured.

▪ Decimation Filter

The digital decimation filter on X-GOLD™215 has two operating modes: 8 kHz output sampling rate and 16 kHz output sampling rate (or 16 kHz output sample rate and 16kHz bandwidth in case of doubled ASMD clock).

3.12.3 Analog Part

The analog part of the X-GOLD™215 audio front-end in audio-out direction consists of a stereo digital to analog converter (multi-bit oversampling converter) which transforms the output of the digital interpolation filter into analog signals. It is followed by the gain control/amplifier section. The DAC outputs can be switched to several output buffers. In audio-in section there is an input multiplexer which selects either one of two differential microphone inputs to be connected to the low-noise amplifier and analog pre-filter. The signals from the analog pre-filter are input to a second-order sigma-delta analog-to-digital converter. In addition there is a connection for FM-radio playing.

▪ Audio-out Part

The analog audio-out part consists of two multi-bit digital-to-analogue converters (DAC) and an output stage. The signal sources are switched to the output drivers in the output stage. The output drivers consist of: a) one mono, differential class-D Loudspeaker driver, b) one mono, differential Earpiece driver and c) one stereo, single-ended (with uni- or bipolar signals), Headset driver.

▪ Digital-to-analog converters

The multi-bit oversampling DACs of the X-GOLD™215 audio front-end convert the 16-bit data words coming from the digital interpolation filters to analogue signals.

▪ Output Amplifier

The different output buffers in X-GOLD™215 are driven by the outputs of the selection block. The differential earpiece driver can be used to drive a 16 Ω earpiece and works in differential. The two single ended headset drivers can be used to drive a 16 Ω headset. They can work unipolar mode, where an AC coupling of the headset might be needed, or can work also in bipolar mode. The differential loudspeaker driver can be used to drive a 8 Ω loudspeaker. As it is a class-D amplifier the needed suppression of the higher harmonics of the switching signals has to be achieved by the external circuitry. The buffers are designed to be short circuit protected.

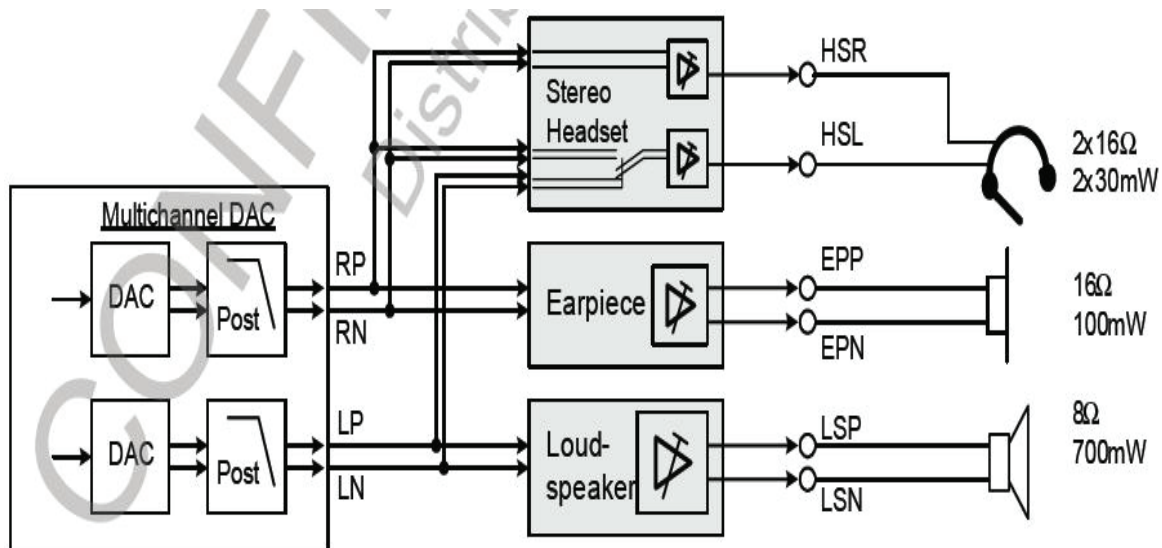


Figure 3.12.3 Switching for R/L DACs onto Buffers

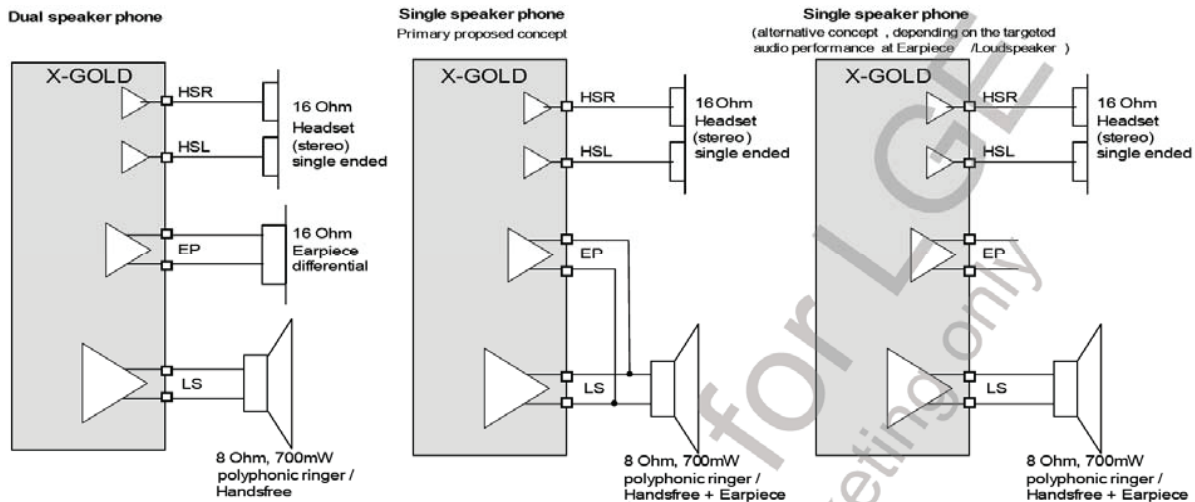


Figure 3.12.4 Different Application Scenarios

In order to achieve the single-speaker concept by parallel connection of Earpiece and Headset amplifier the Earpiece amplifier have to sustain the up to 5 V voltage of the class-D amplifier.

▪ Audio-in Path

The audio-in path of X-GOLD™215 provides two differential microphone input sources, MIC1 and MIC2.

- The inputs for microphone MIC1 are MICP1 and MICN1.
- The inputs for microphone MIC2 are MICP2 and MICN2.

The audio-in path consists of an input selector, a low noise amplifier and following pre-filter with gain control, a second order $\Sigma\Delta$ -converter and a digital decimation filter. It supports both standard GSM (bandwidth 3.5 kHz) and wideband (bandwidth 7 kHz) speech bands.

The differential input signal from the microphone first passes a low noise amplifier and following pre-filter and an anti-aliasing pre-filtering stage achieving an overall variable gain ranging from 0 dB to +39 dB. The signal is then modulated by a second order $\Sigma\Delta$ -converter which is clocked with the same clock rate as the digital to analog converters. The $\Sigma\Delta$ -converter delivers a 1-bit pulse density modulated data stream at a rate of 2 MHz to the digital decimation filter which reduces the rate to 8 kHz or 16 kHz, depending on the current mode.

To improve SNR the sample frequency can be doubled in dedicated modes and the modulated data stream is 4MHz instead of 2 MHz.

▪ Microphone Supply

X-GOLD™215 has a single ended power-supply concept for electret microphones:

For both modes a minimal load capacitance of t.b.d. nF is necessary to guarantee stable operation of the buffer.

The maximal load capacitance must not exceed t.b.d. nF.

2 microphone supplies VMIC and VUMIC are available. The supply VUMIC has a ultra-low-power mode, where the current consumption is minimum, whilst at the same time the noise performance is reduced.

For this purpose the VUMIC is directly supplied out of the VMIC regulator, the Mic-Buffer can be switched off and only the quiescent current of the VMIC regulator is present.

This mode can be used to supply a headset and allow accessory detection with highly reduced current consumption For normal operation the supply can be switched to normal operation mode with improved noise performance. In case of an digital microphone VMIC can be used for supplying this microphone.

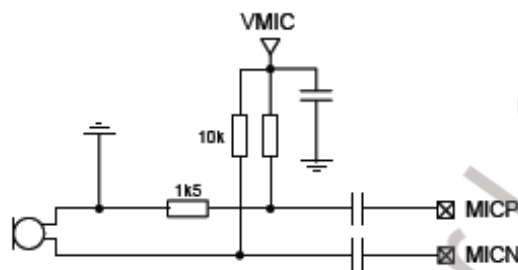


Figure 3.12.5 Typical Microphone Supply Generation (alternative)

3.13 Camera Interface(2M Fixed Focus Camera)

3.13.1 XMM215 Camera Interface

The Camera Interface (CIF) represents a complete video and still picture input interface (see Figure 26).

The CIF contains image processing, scaling, and compression functions. The integrated image processing unit supports image sensors with integrated $YCbCr$ processing.

Scaling is used for downsizing the sensor data for either displaying them on the LCD, or for generating data streams for MPEG-4 compression. In general, $YCbCr$ 4:2:2 JPEG compressed images should use the full sensor resolution, but they can also be downscaled to a lower resolution for smaller JPEG files. Scaling also can be used for digital zoom effects, because the scalers are capable of up-scaling as well.

CIF

All data is transmitted via the memory interface to an AHB bus system using a bus master interface.

Programming is done by register read/write transactions using an AHB slave interface.

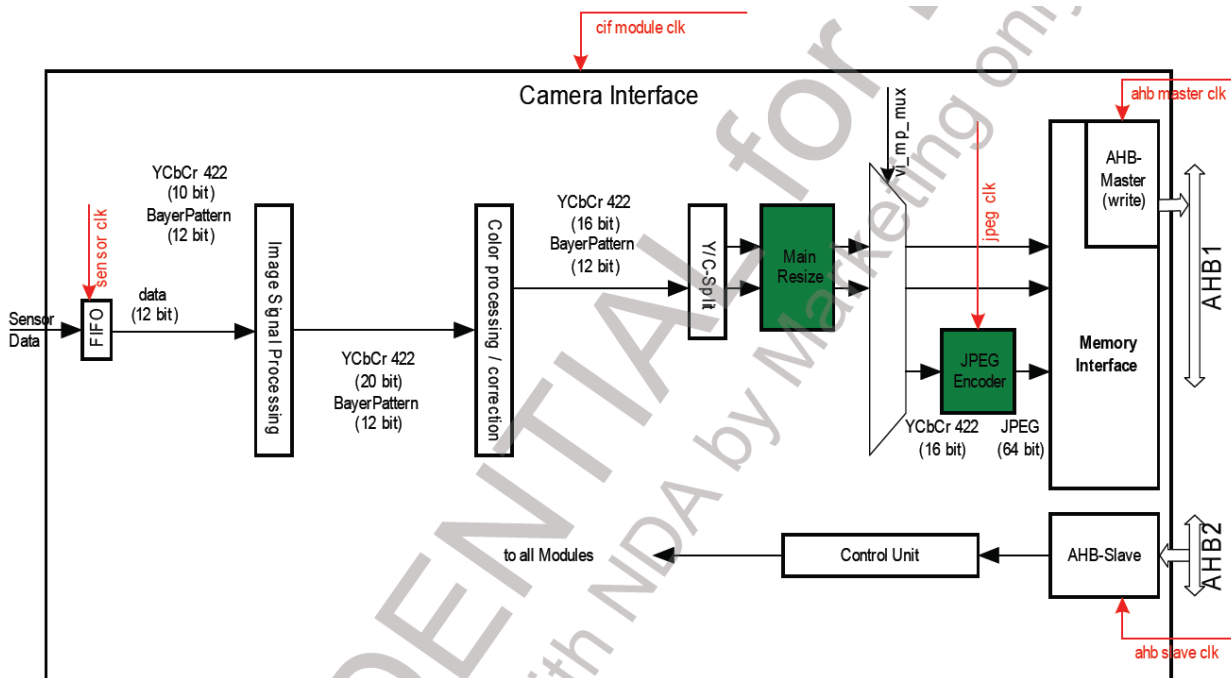


Figure 3.13.1 Block Diagram of Camera Interface

Functional Overview of CIF

The following list gives an overview over the CIF's functionality:

- 78 MHz system clock
- 78 MHz sensor clock
- 78 MHz JPEG encoder clock
- 32-bit AHB slave programming interface
- ITU-R BT 601 compliant video interface supporting YC_bC_r
- ITU-R BT 656 compliant video interface supporting YC_bC_r data
- 8-bit camera interface
- 12-bit resolution per color component internally
- YC_bC_r 4:2:2 processing
- Hardware JPEG encoder incl. JFIF1.02 stream generator and programmable quantization and Huffman tables
- Windowing and frame synchronization
- Continuous resize support
- Frame skip support for video (e.g. MPEG-4) encoding
- Macro block line, frame end, capture error, data loss interrupts and sync. (h_start, v_start) interrupts
- Programmable polarity for synchronization signals
- Luminance/chrominance and chrominance blue/red swapping for YUV input signals
- Maximum input resolution of 3 Mpixels (2048x1536 pixels)
- Main scaler with pixel-accurate up- and down-scaling to any resolution between 3 MP (2048x1536) and 32x16
- pixel in processing mode
- Buffer in system memory organized as ring-buffer
- Buffer overflow protection for raw data and JPEG files
- Asynchronous reset input, software reset for the entire IP and separate software resets for all sub-modules
- Interconnect test support
- Semi planar storage format
- Color processing (contrast, saturation, brightness, hue)
- Power management by software controlled clock disabling of currently not needed sub-modules

3. TECHNICAL BRIEF

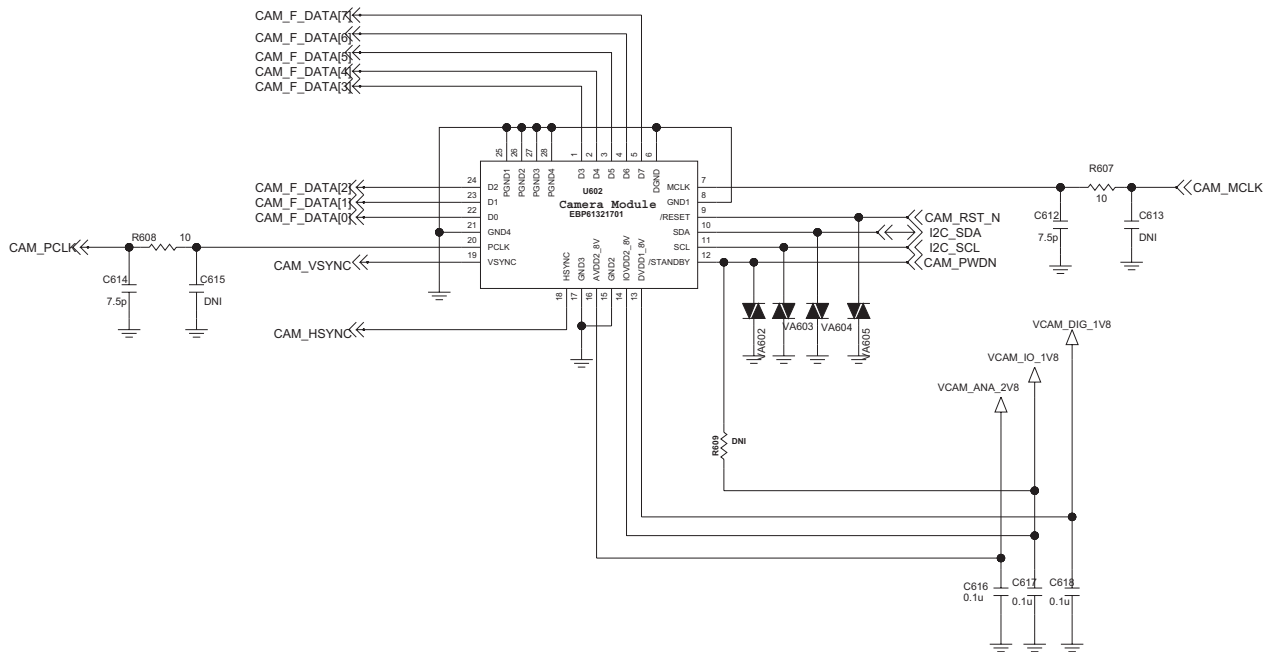


Figure 3-14 Camera circuit

3.14 Touch Interface

The touch controller is an analog interface circuit for a human interface touch screen device. All of touch functions are composed of a register-based architecture and are controlled through the internal register sets by serial interface.

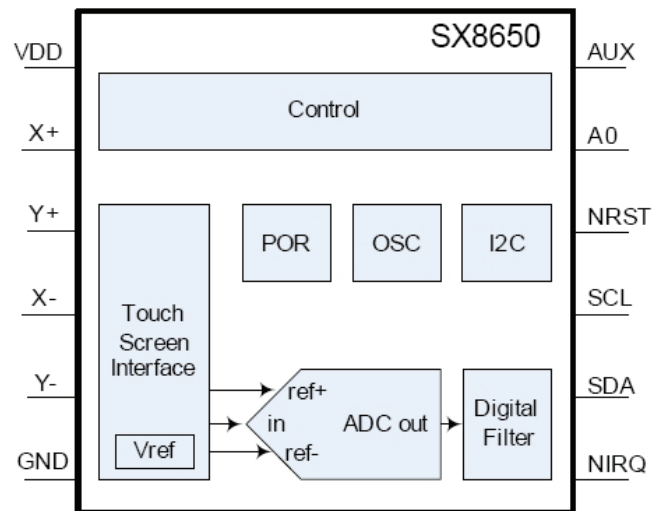


Figure 3-14 Touch Driver Block Diagram

The SX8650 is designed for 4-wire resistive touch screen applications. The touch screen or touch panel is the resistive sensor and can be activated by either a finger or stylus. The touch screen coordinates and touch pressure are converted into I2C format by the SX8650 for transfer to the host.

The SX8650's channel pins (X+, X-, Y+, Y-) directly connect to standard touch screen X and Y resistive layers. The SX8650 separately biases each of these layers and converts the resistive values into (X,Y) coordinates. The channel pins are protected to VDD and GROUND.

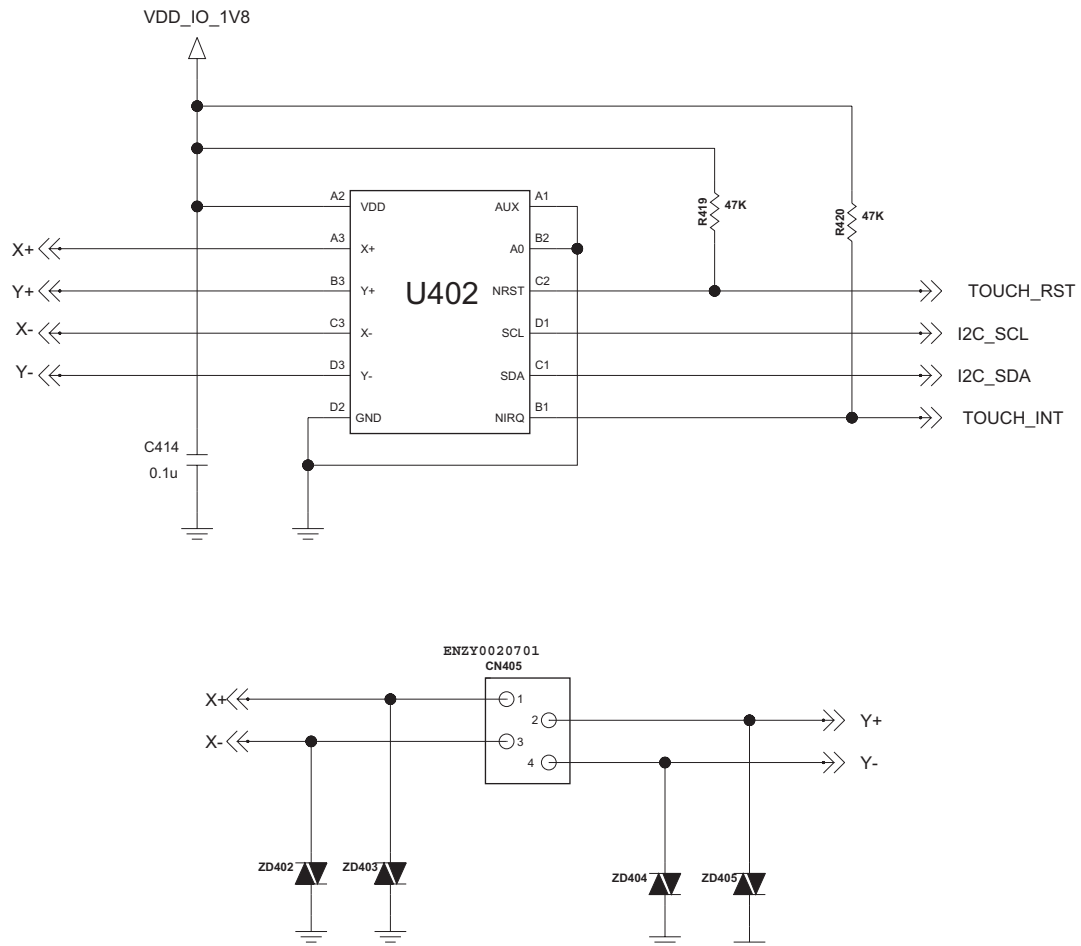
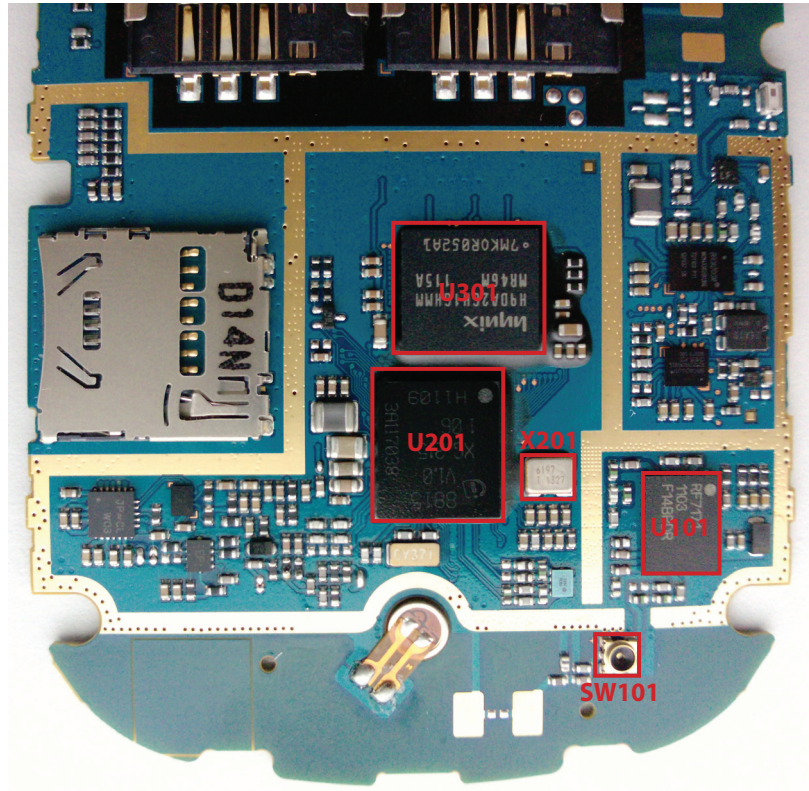


Figure 3-15-2 Touch Driver Block

4. TROUBLE SHOOTING

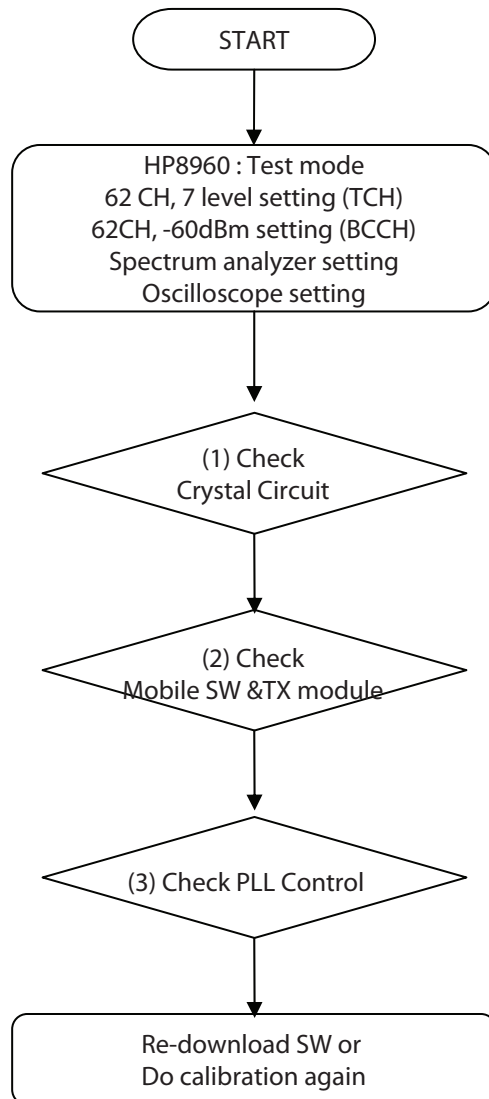
4.1 RF Component



U301	Memory(2G NAND/1G SDRAM) H9DA2GH1GHMMMR-46M
U201	Main Chip (A-GOLD RADIO NAND) PMB8815
U101	GPRS QUAD TX DUAL RX MODULE RF7171
X201	Crystal, 26MHz Clock TSX- 3225
SW101	RF Switch MS-156C

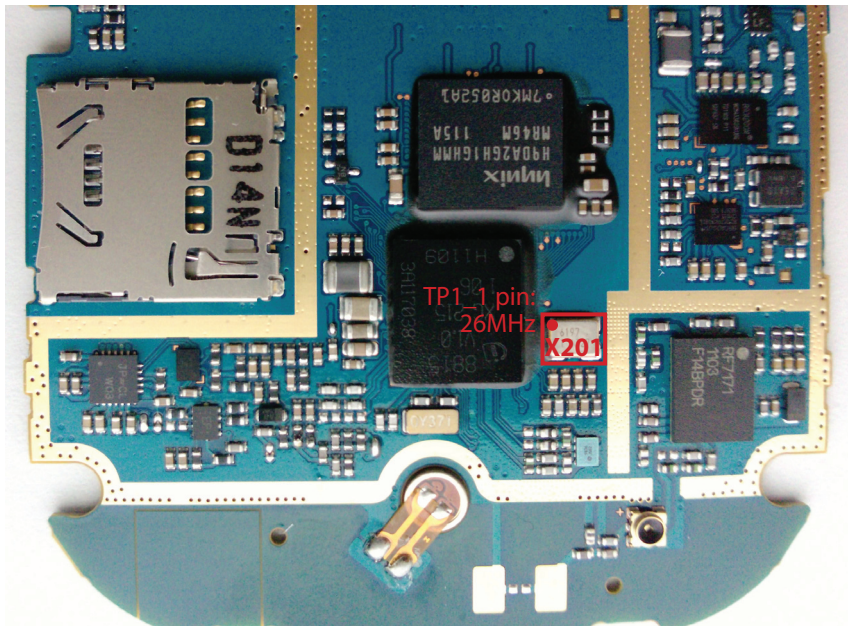
4.2 RX Trouble

CHECKING FLOW

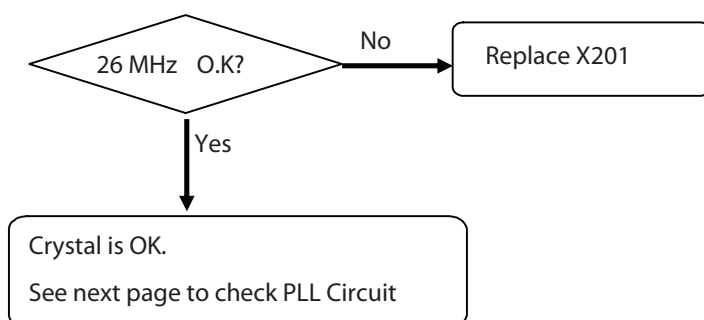


(1) Checking Crystal Circuit

TEST POINT

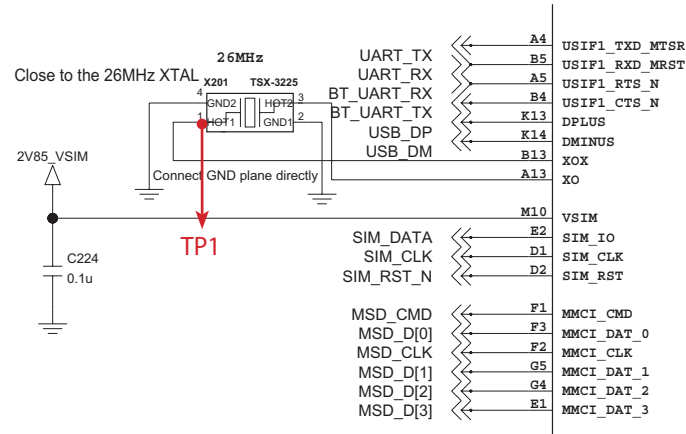


CHECKING FLOW

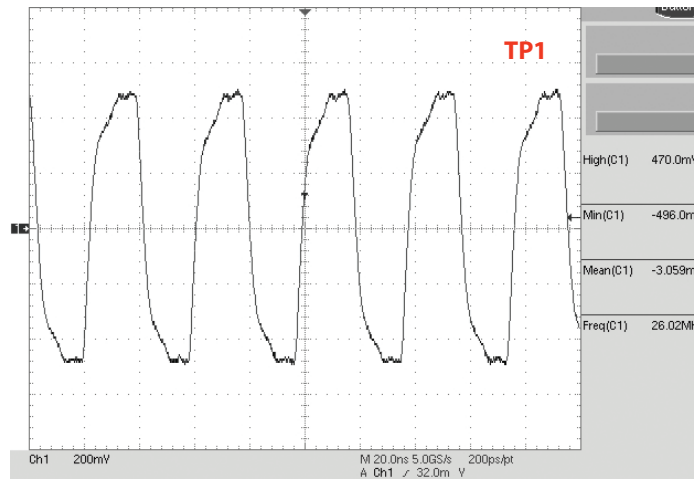


4. TROUBLE SHOOTING

CIRCUIT

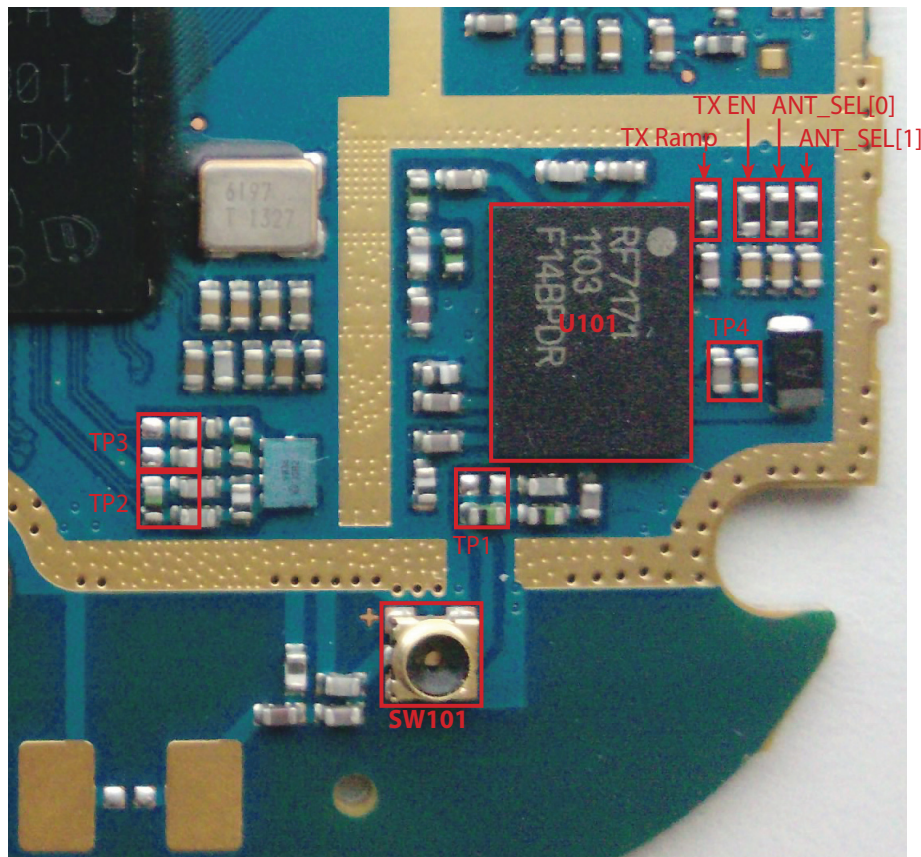


WAVEFORM



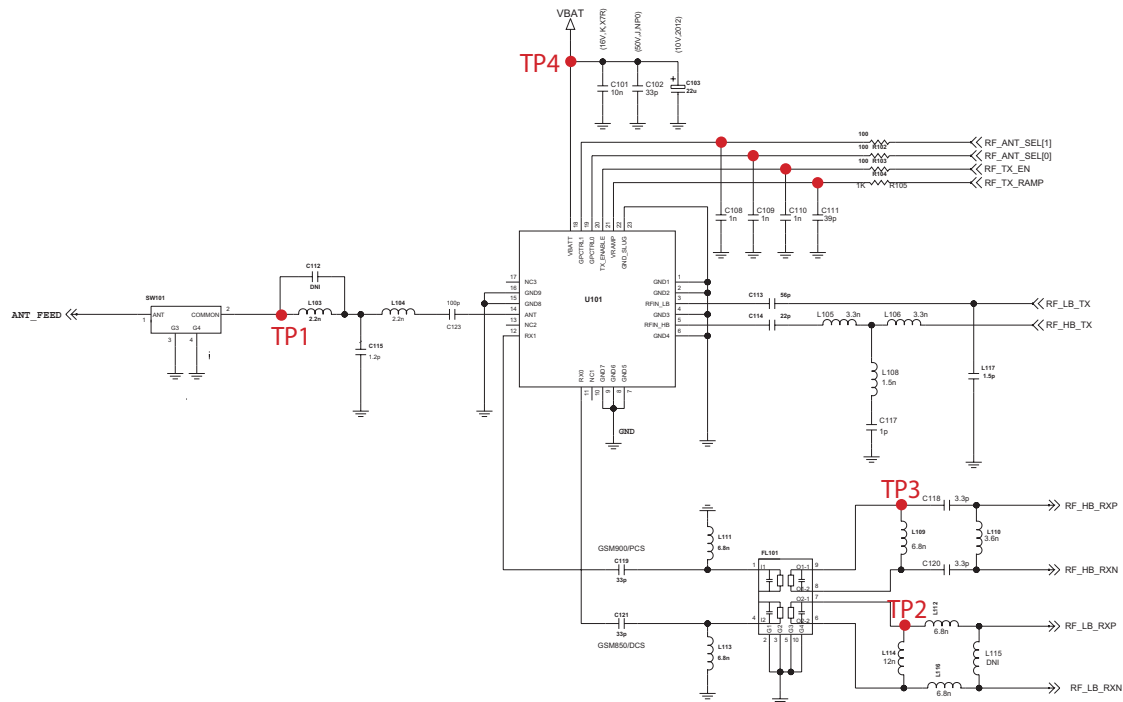
(2) Checking Mobile SW & TX Module

TEST POINT



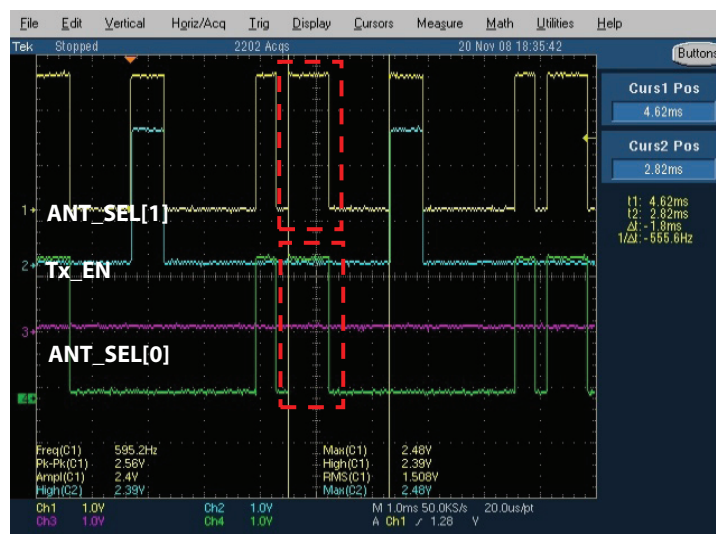
4. TROUBLE SHOOTING

CIRCUIT

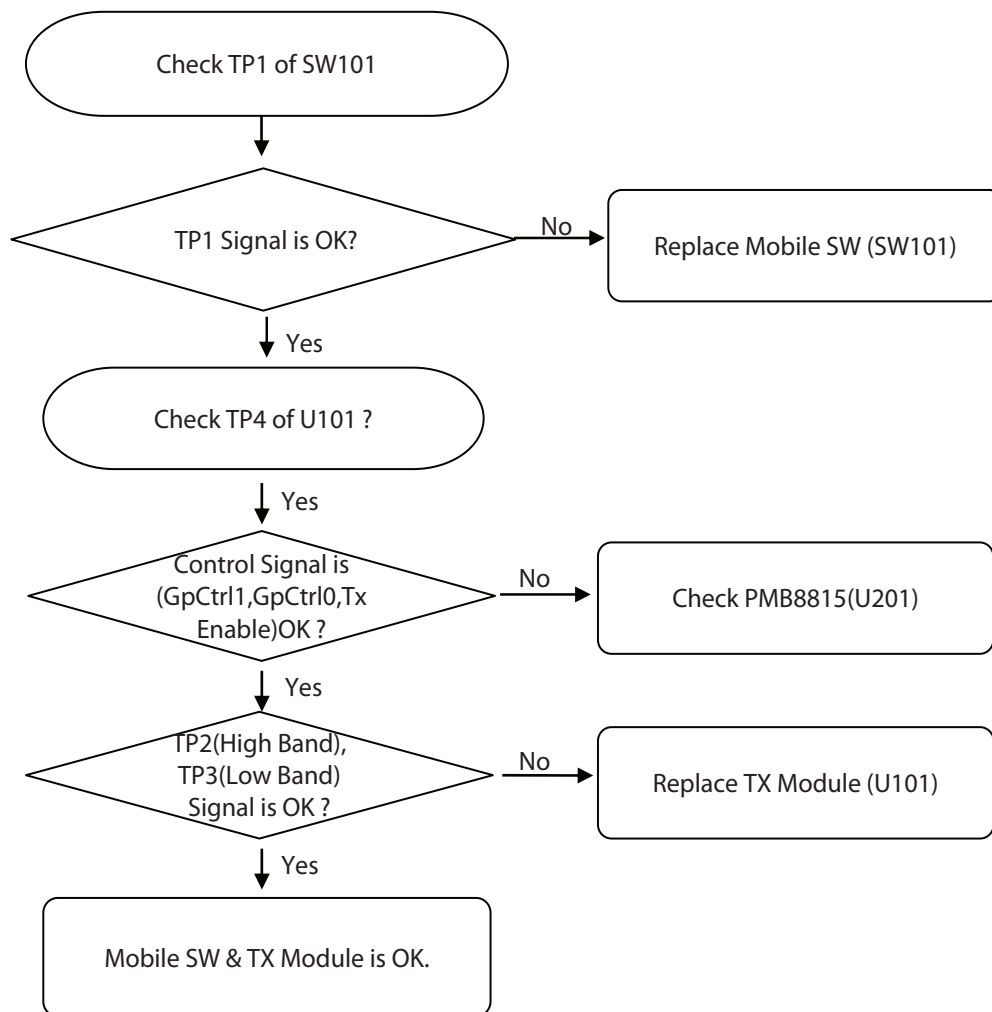


WAVEFORM

EGSM Rx



CHECKING FLOW

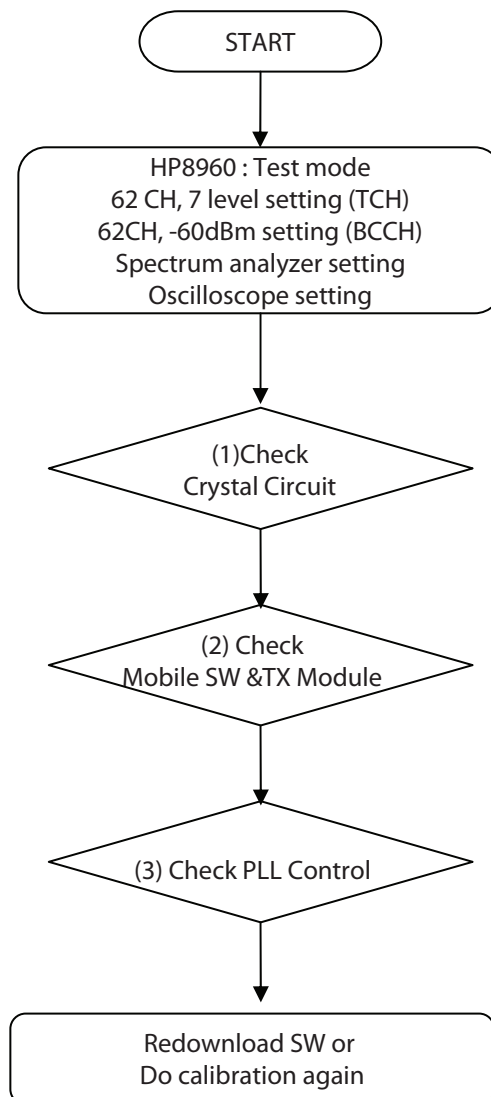


EGSM Rx

MODE	GpCtrl1	GpCtrl0	Tx Enable
STANDBY	LOW	LOW	LOW
RX0	HIGH	LOW	LOW
RX1	HIGH	HIGH	LOW
850/900 TX	HIGH	LOW	HIGH
DCS/PCS TX	HIGH	HIGH	HIGH

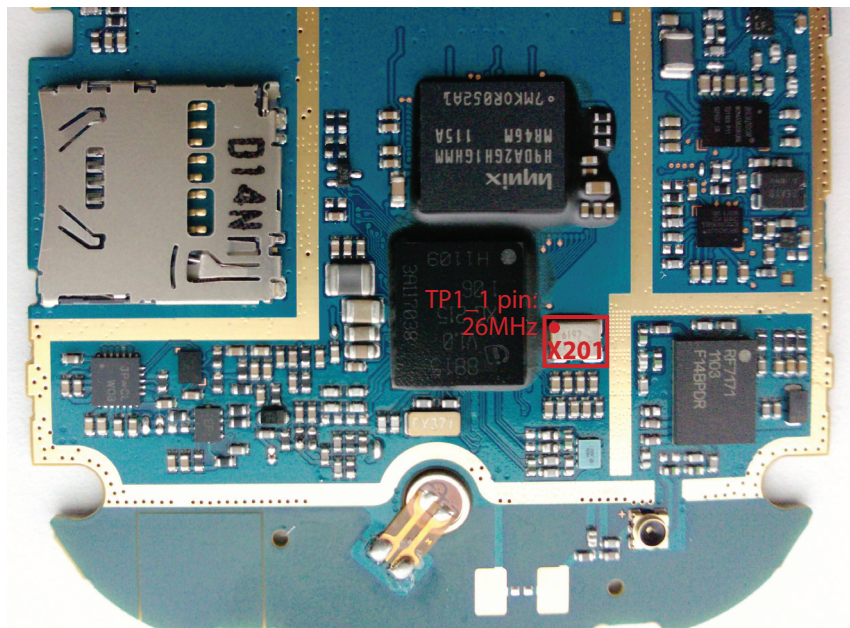
4.3 TX Trouble

CHECKING FLOW

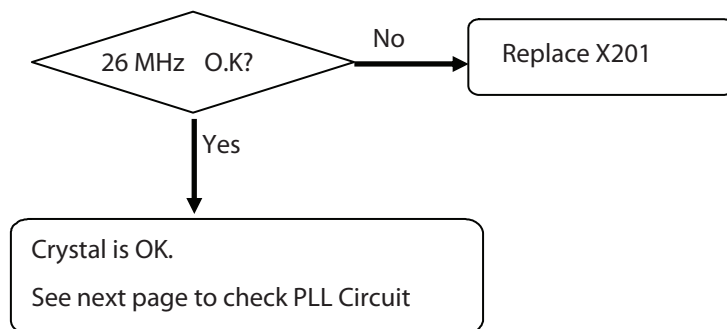


(1) Checking Crystal Circuit

TEST POINT

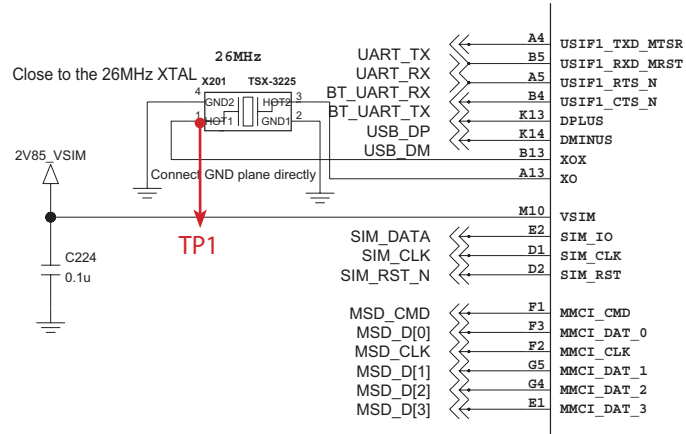


CHECKING FLOW

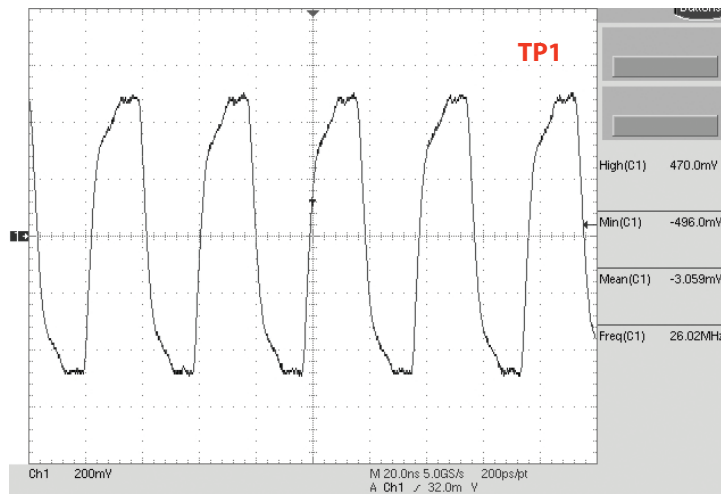


4. TROUBLE SHOOTING

CIRCUIT

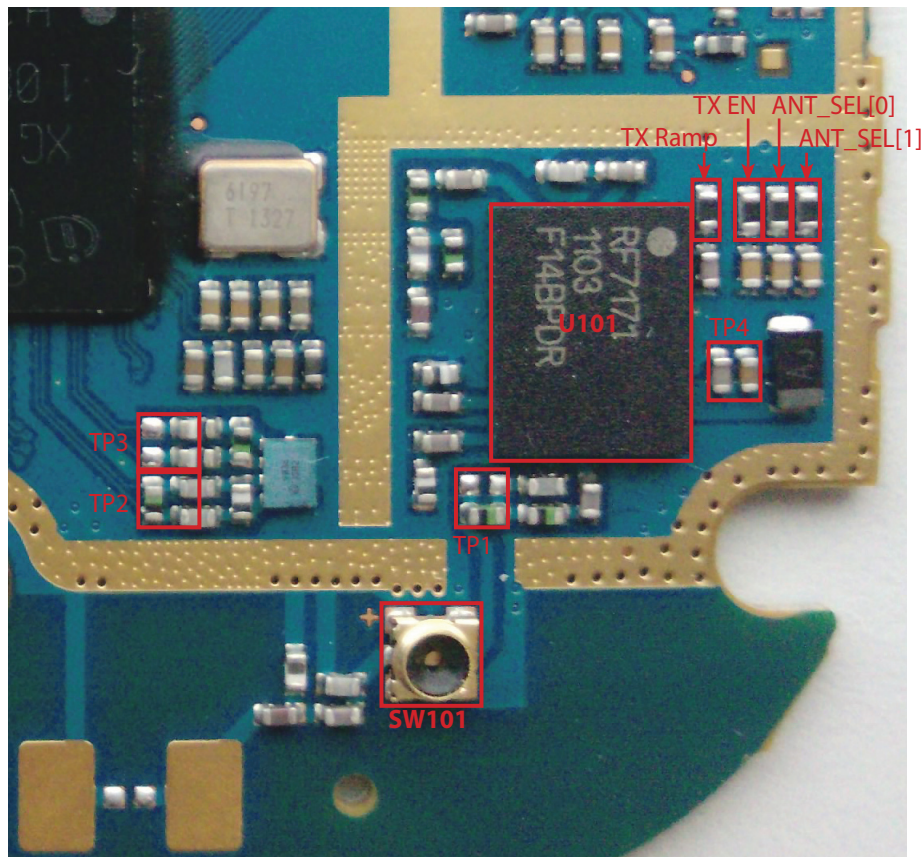


WAVEFORM



(2) Checking Mobile SW &TX Module

TEST POINT



CIRCUIT



File Edit Vertical HORIZ/Acq Trig Display Cursors Measure Math Utilities Help

Tek Stopped 2002 Acqs 20 Nov 08 18:35:42 Buttons

Curs1 Pos
4.62ms

Curs2 Pos
2.82ms

T1: 4.62ms
T2: 2.82ms
Δ: -1.8ms
1/Δ: -555.6Hz

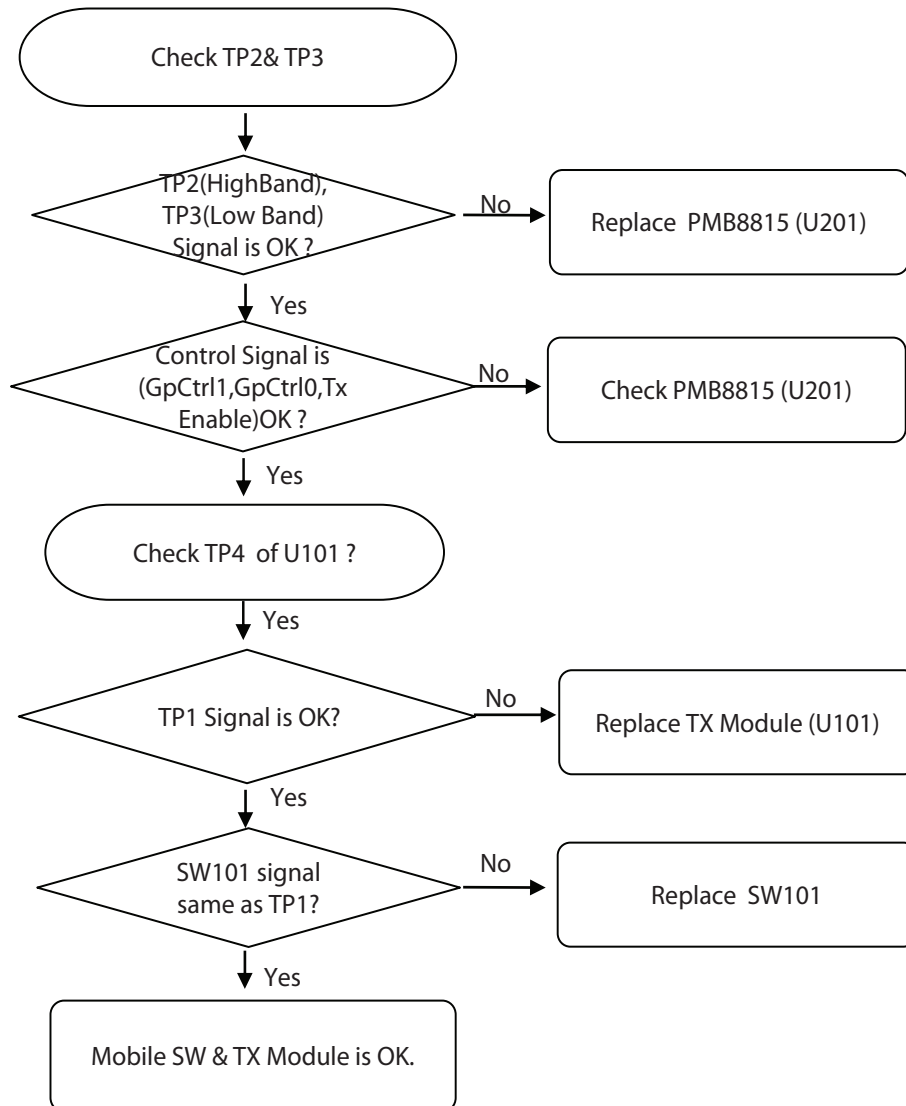
1 ANT_SEL[1]
2 Tx_EN
3 ANT_SEL[0]

Freq(C1) 565.2Hz
Pk-Pk(C1) 2.50V
Ampl(C1) 2.4V
High(C2) 2.39V

Max(C1) 2.48V
High(C1) 2.39V
RMS(C1) 1.508V
Max(C2) 2.48V

Ch1 1.0V Ch2 1.0V M 1.0ms 50.0KHz 20.0us/pt
Ch3 1.0V Ch4 1.0V A Ch1 / 1.28 V

CHECKING FLOW

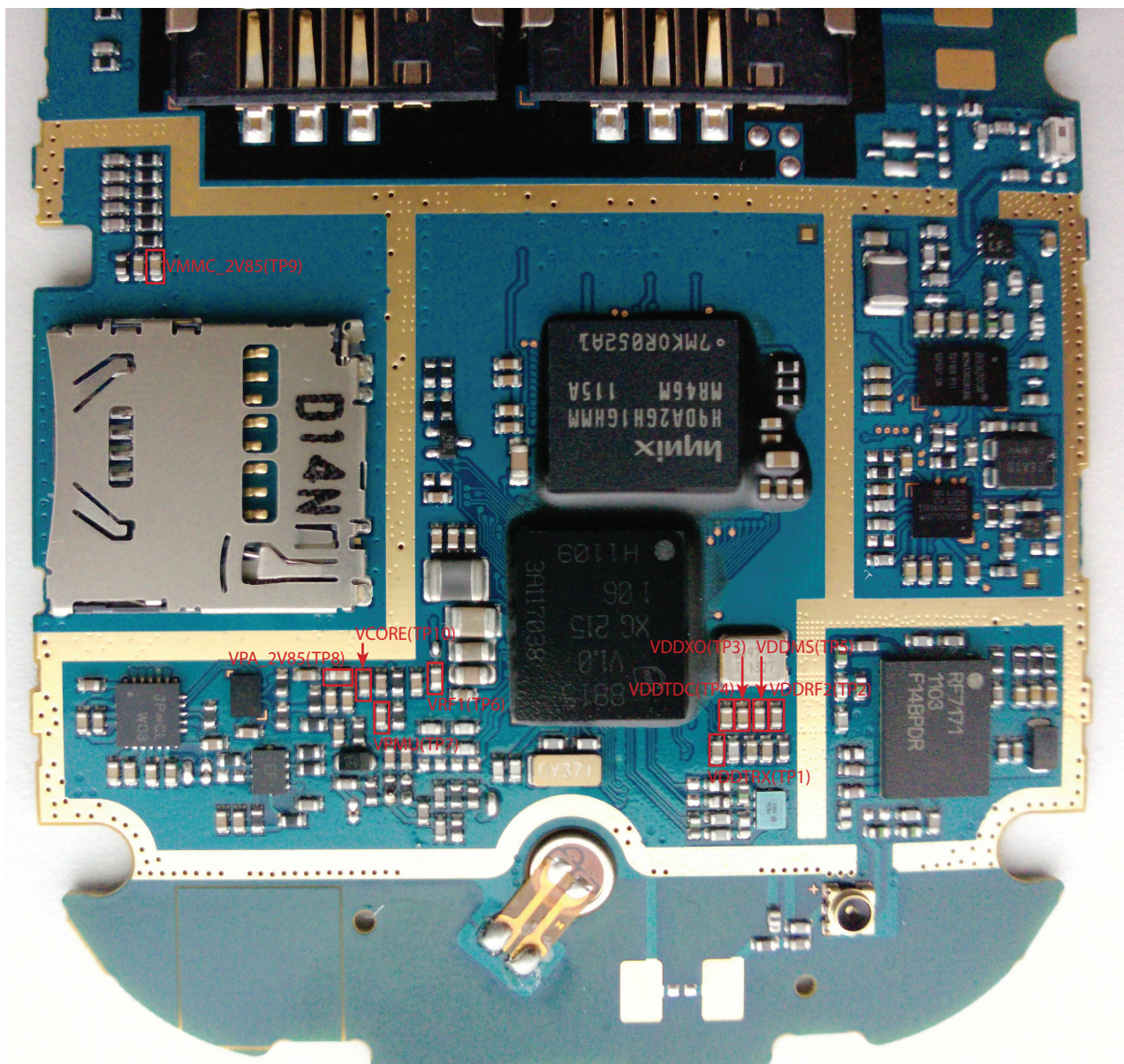


EGSM Tx

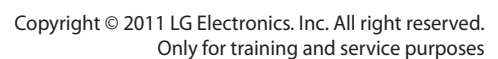
MODE	GpCtrl1	GpCtrl0	Tx Enable
STANDBY	LOW	LOW	LOW
RX0	HIGH	LOW	LOW
RX1	HIGH	HIGH	LOW
850/900 TX	HIGH	LOW	HIGH
DCS/PCS TX	HIGH	HIGH	HIGH

4.4 Power On Trouble

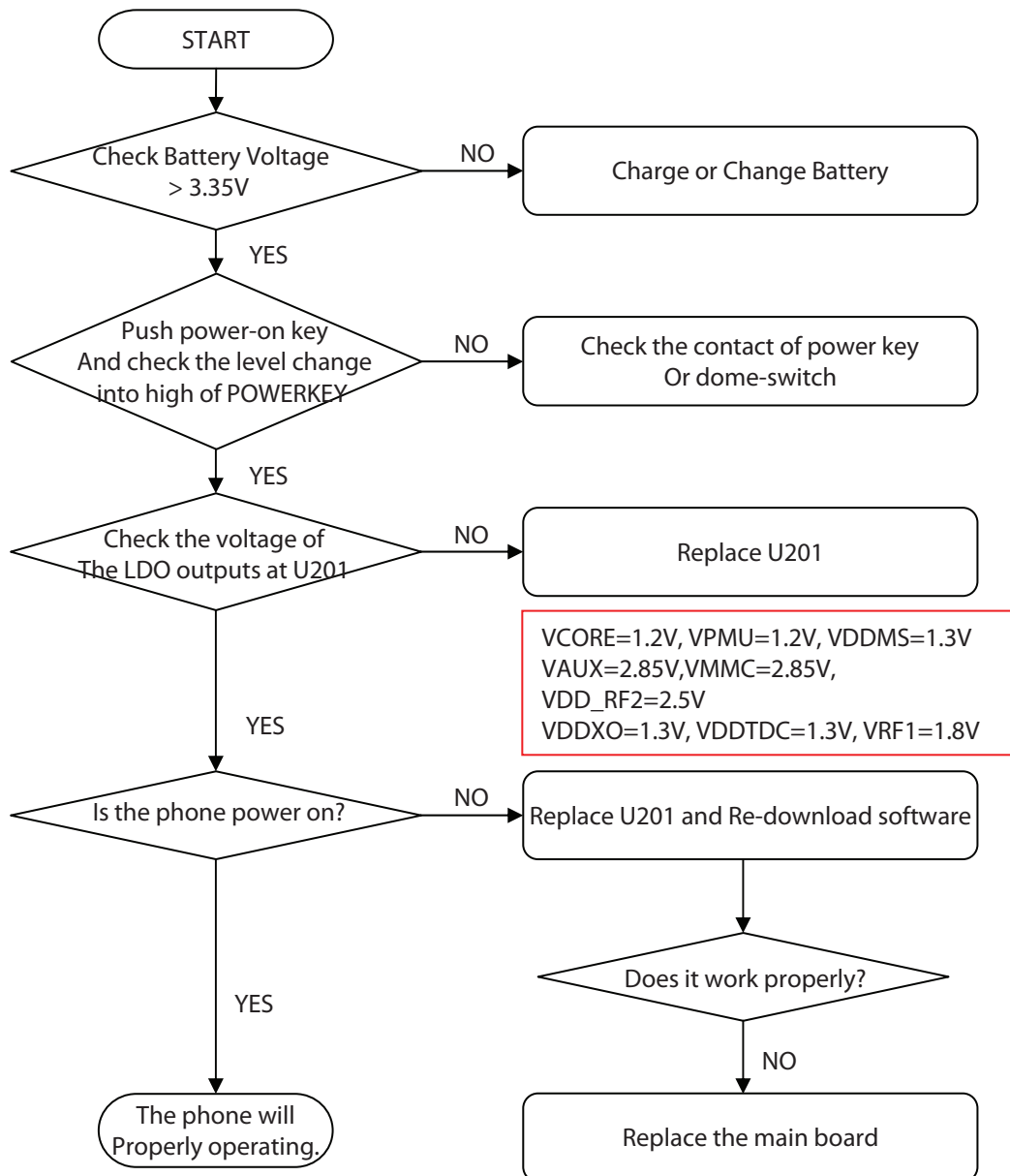
TEST POINT



CIRCUIT

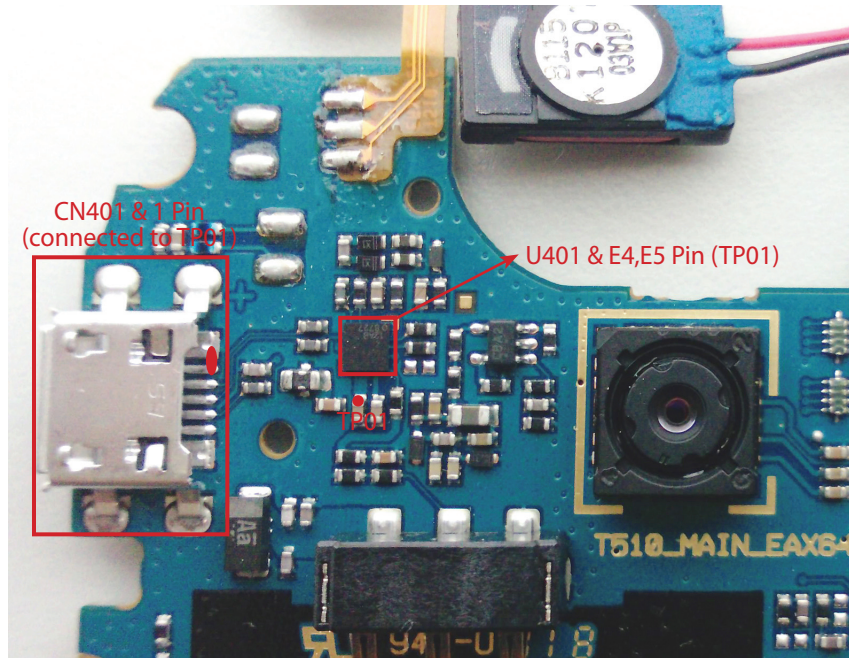


CHECKING FLOW

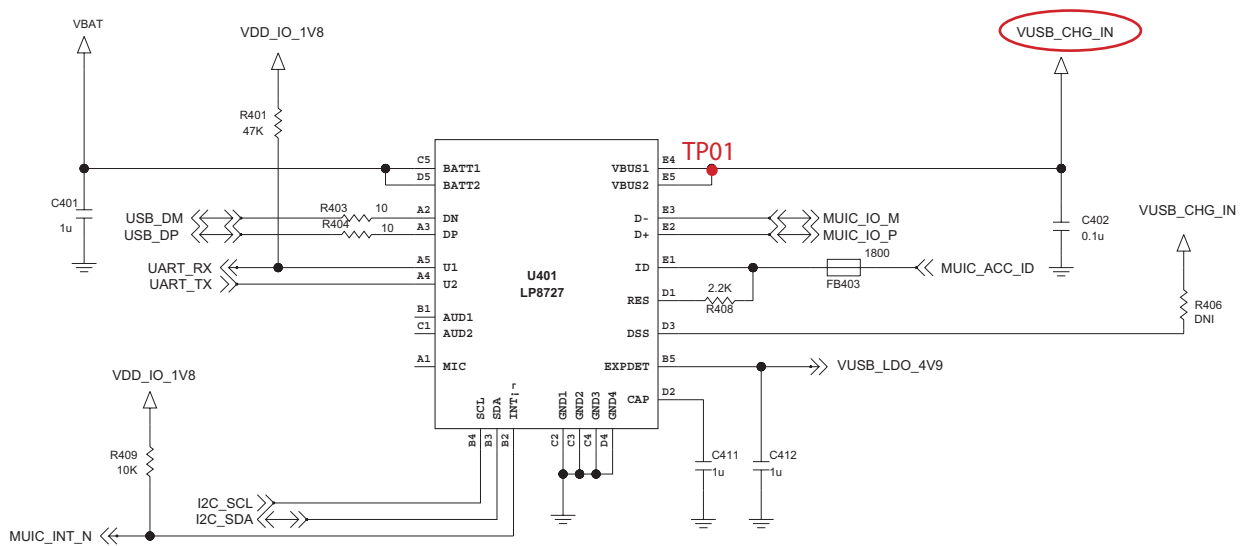


4.5 Charging Trouble

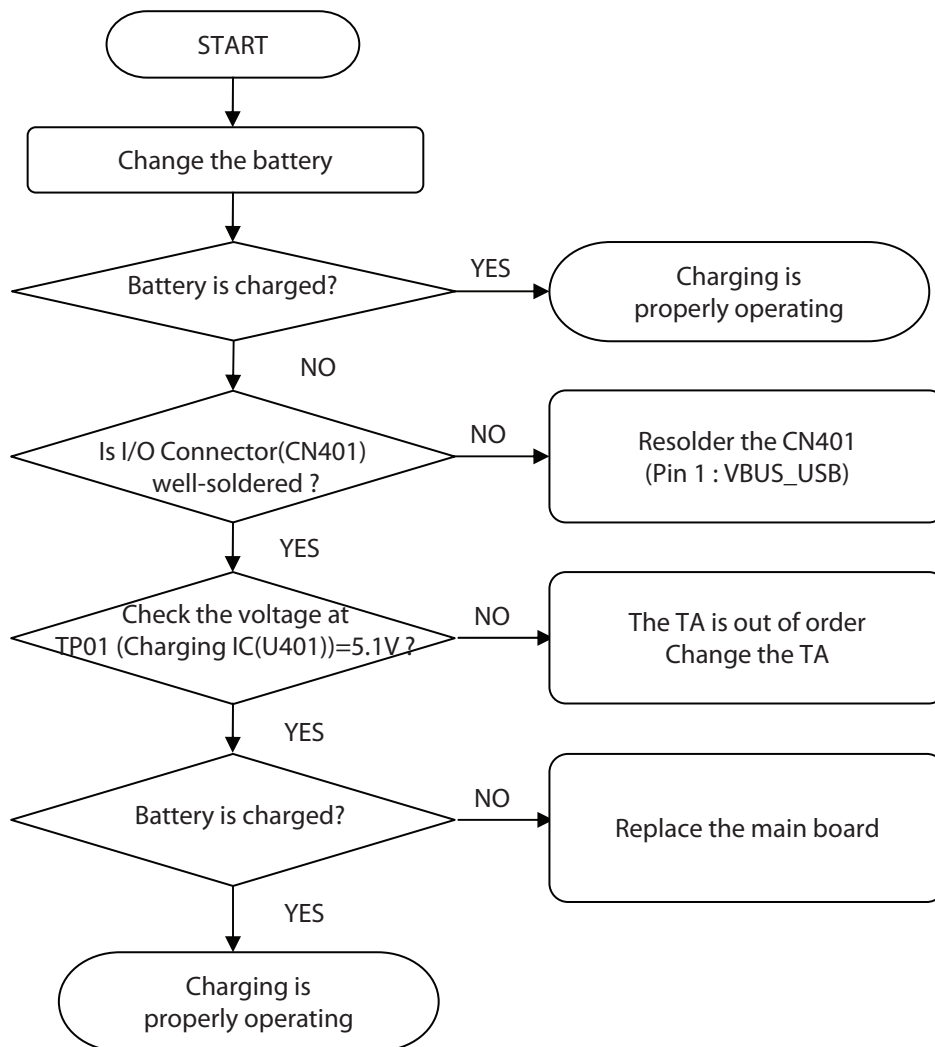
TEST POINT



CIRCUIT

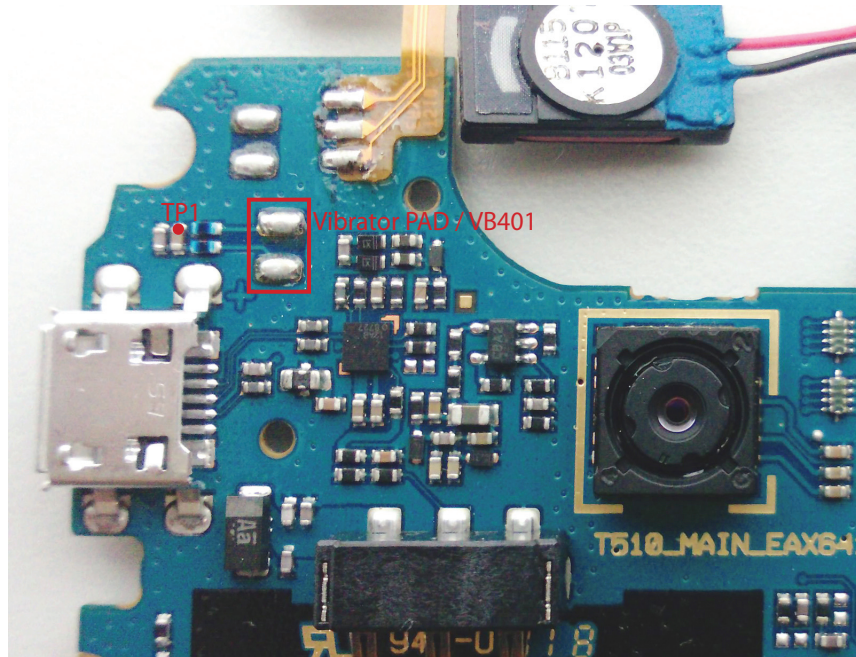


CHECKING FLOW



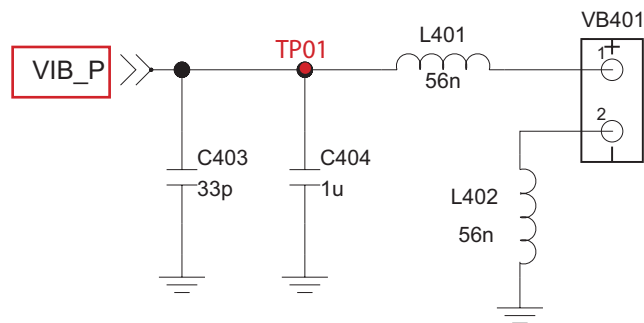
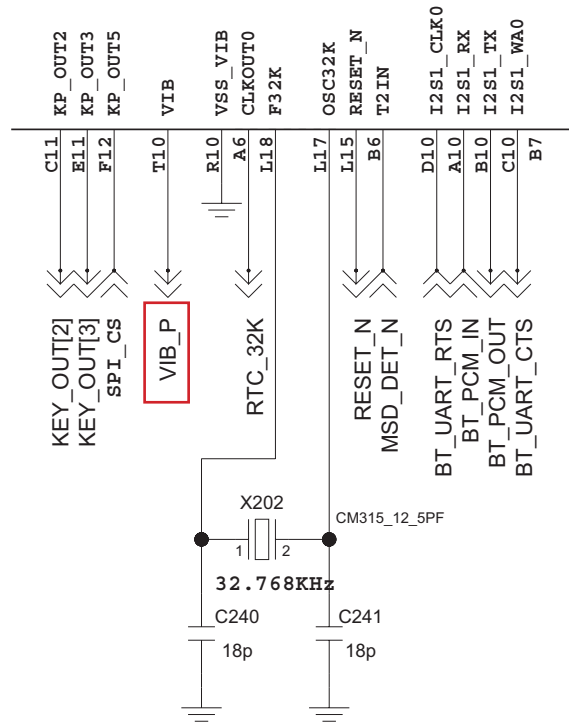
4.6 Vibrator Trouble

TEST POINT



CIRCUIT

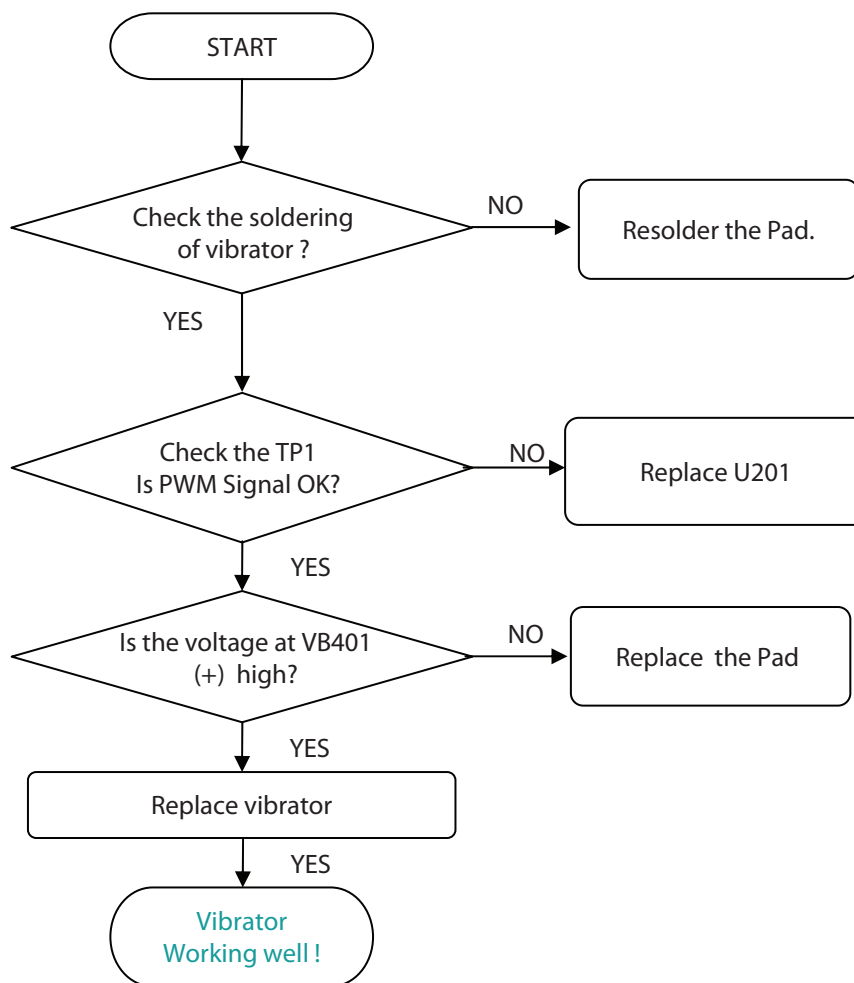
MAIC IC (U201)



4. TROUBLE SHOOTING

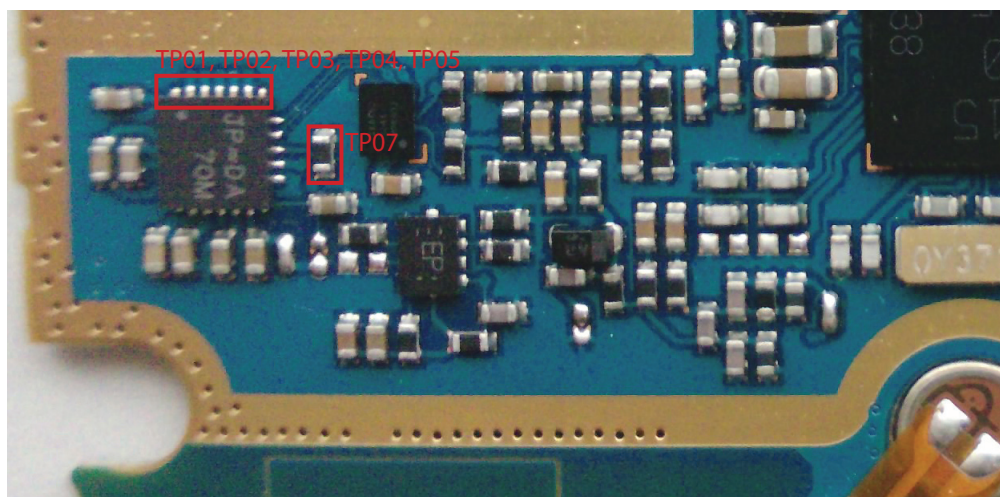
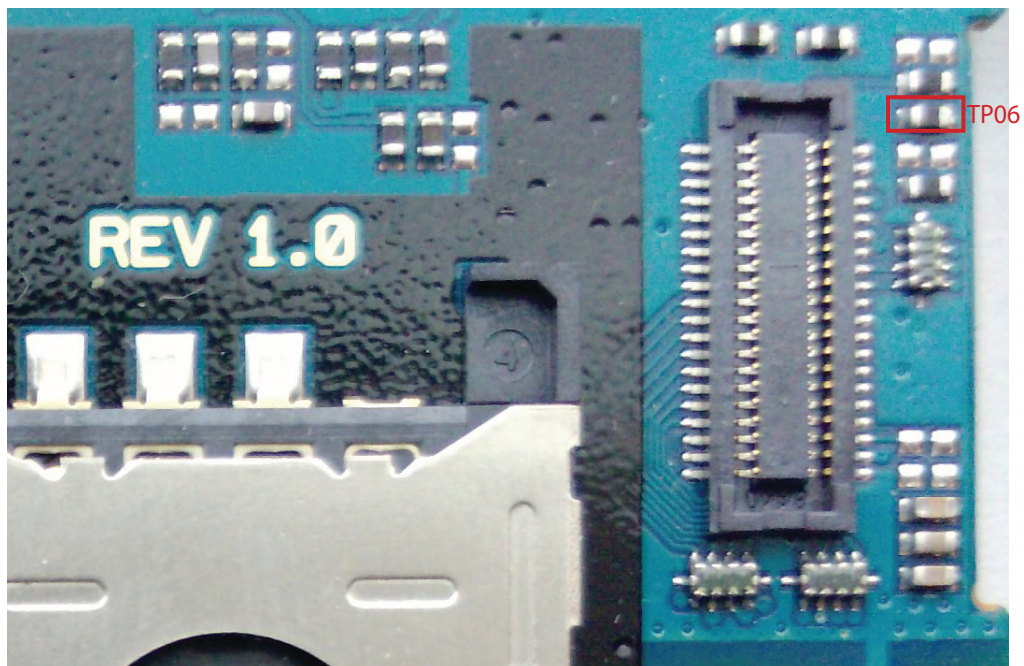
CHECKING FLOW

SETTING : Enter the engineering mode, and set vibrator on at vibration of BB test menu



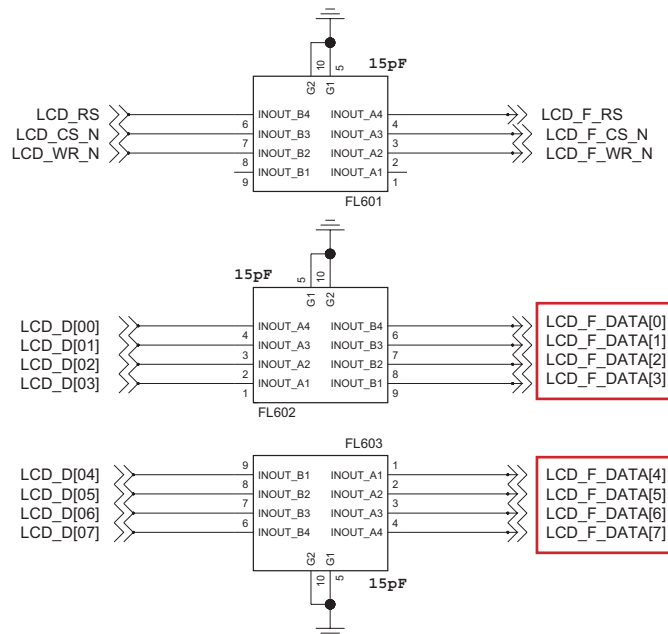
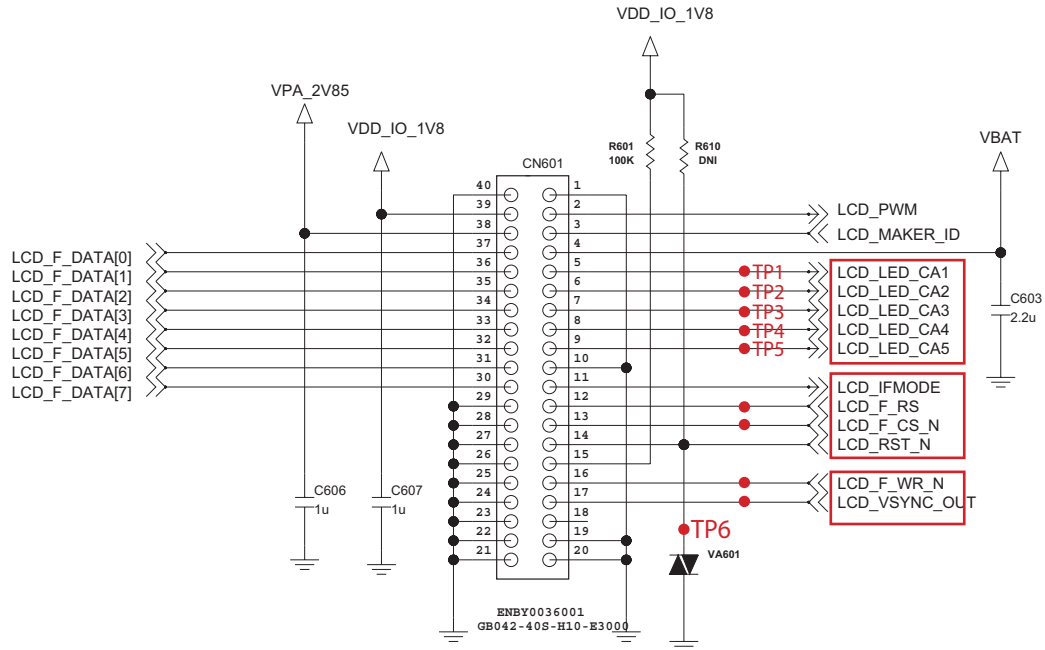
4.7 LCD Trouble

TEST POINT

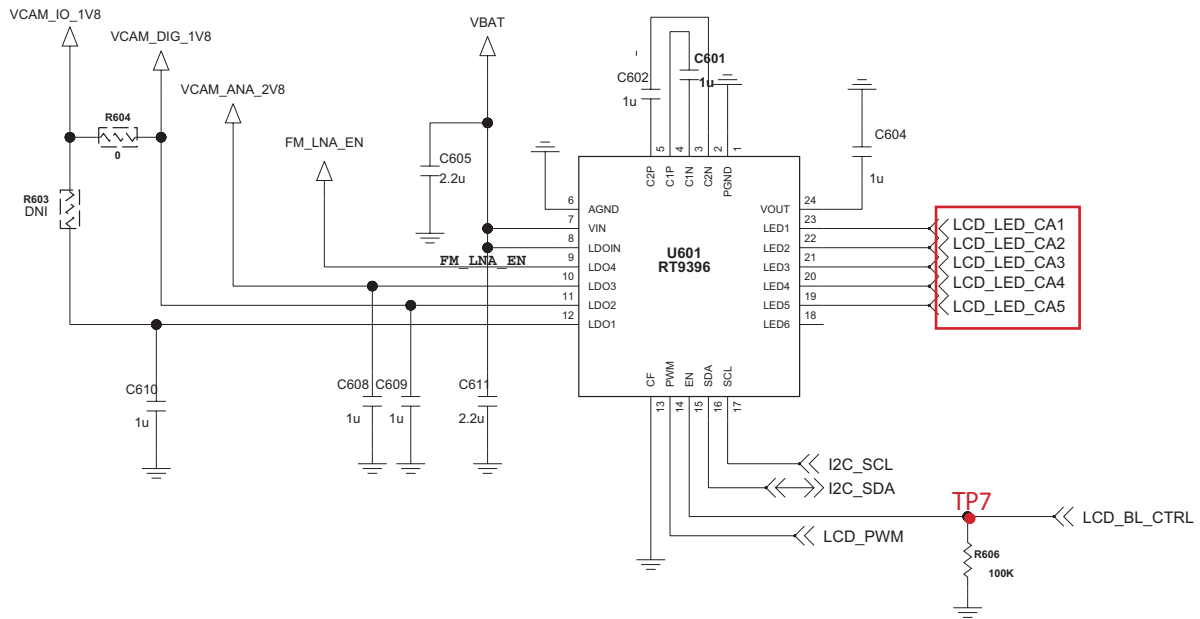


4. TROUBLE SHOOTING

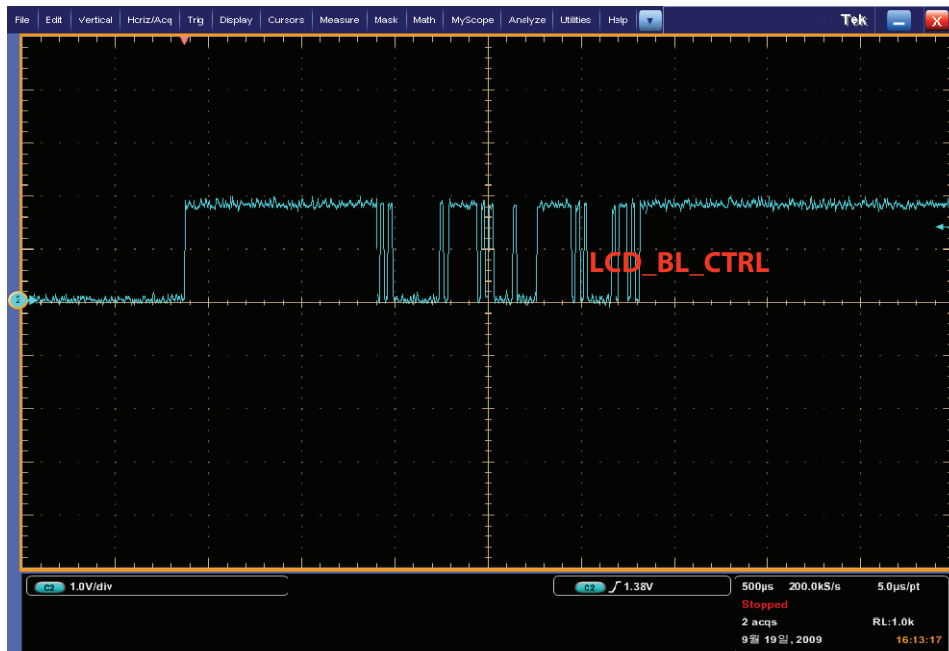
CIRCUIT



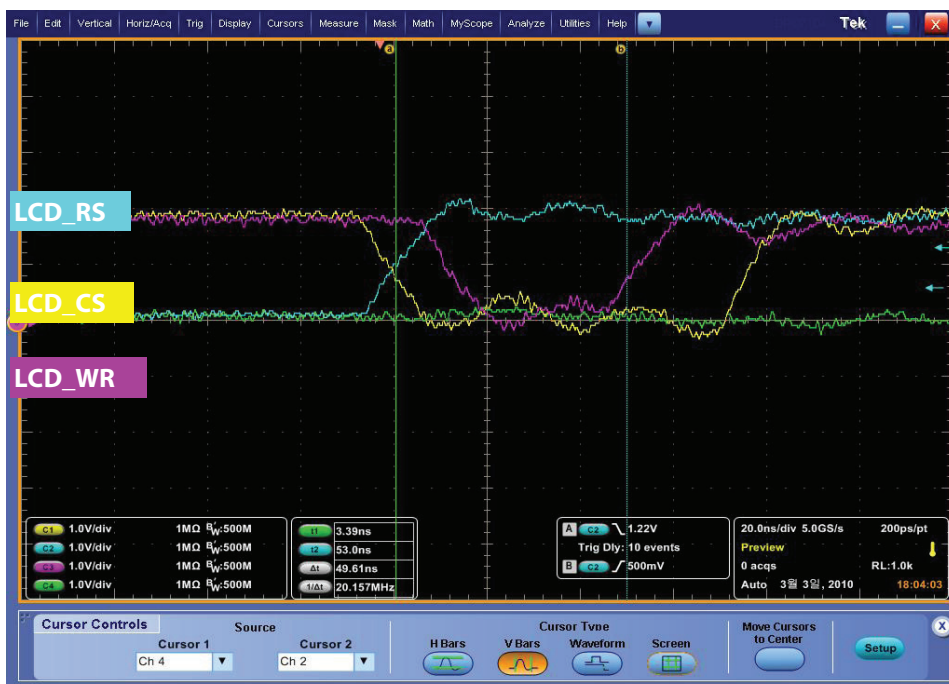
CIRCUIT



Waveform

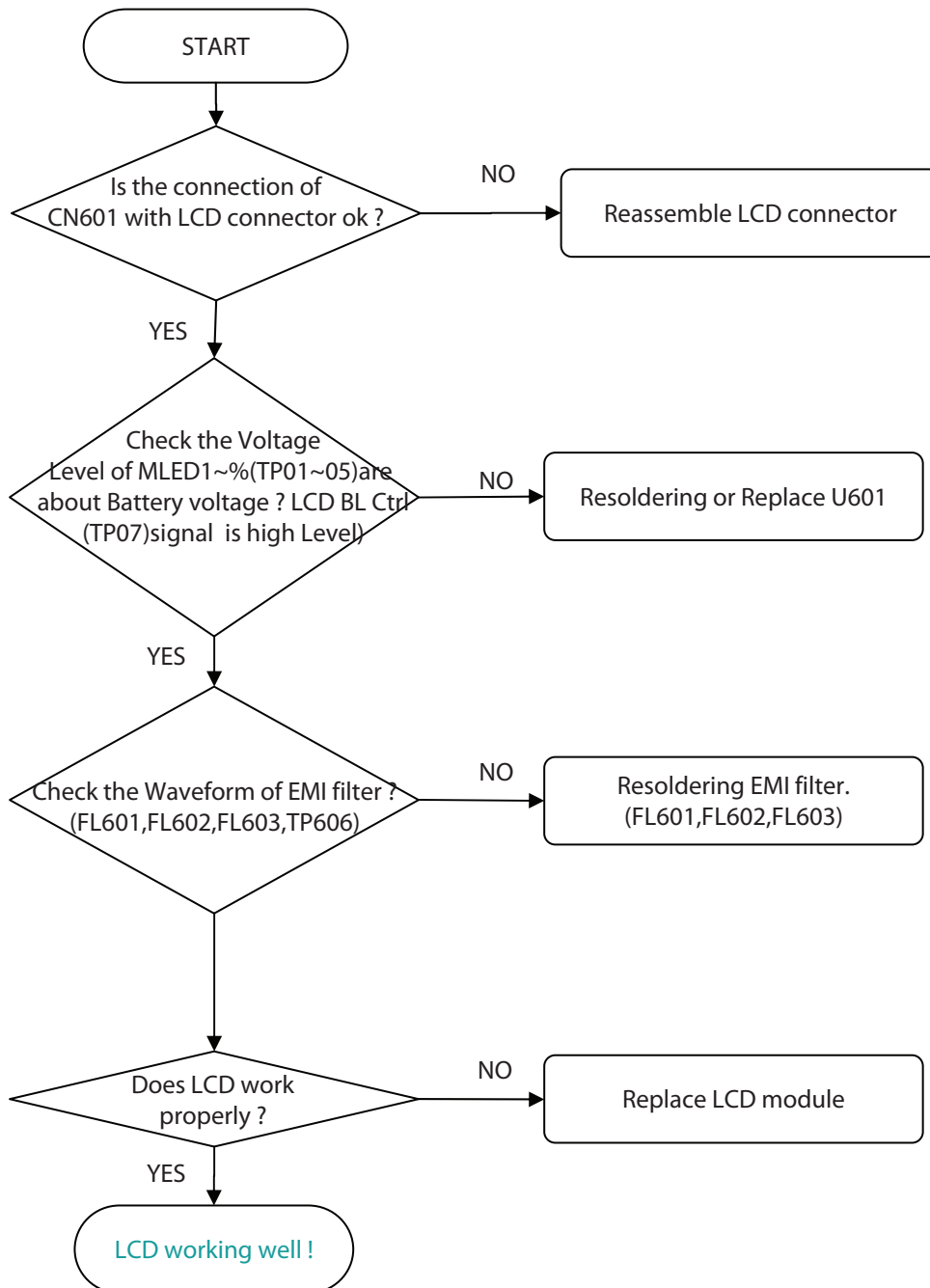


Graph 4.7.1. LCD Backlight Control Signal Waveform



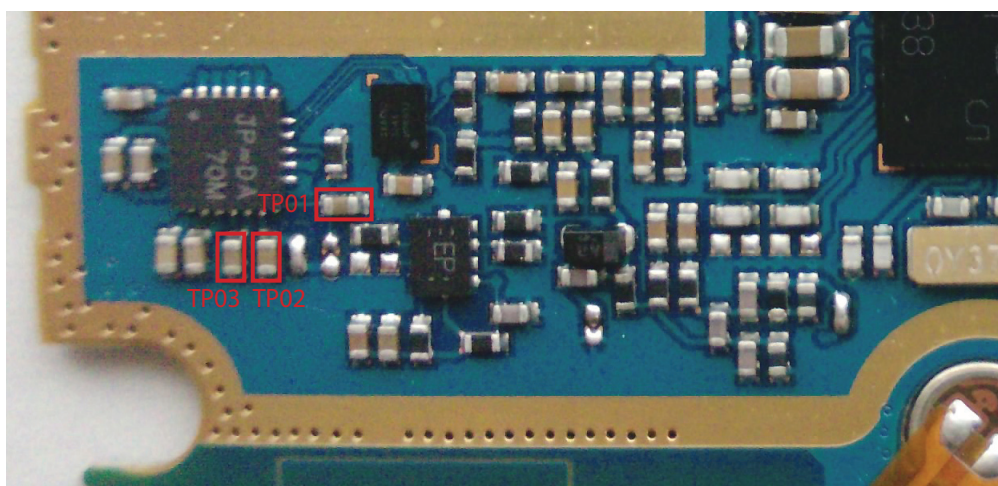
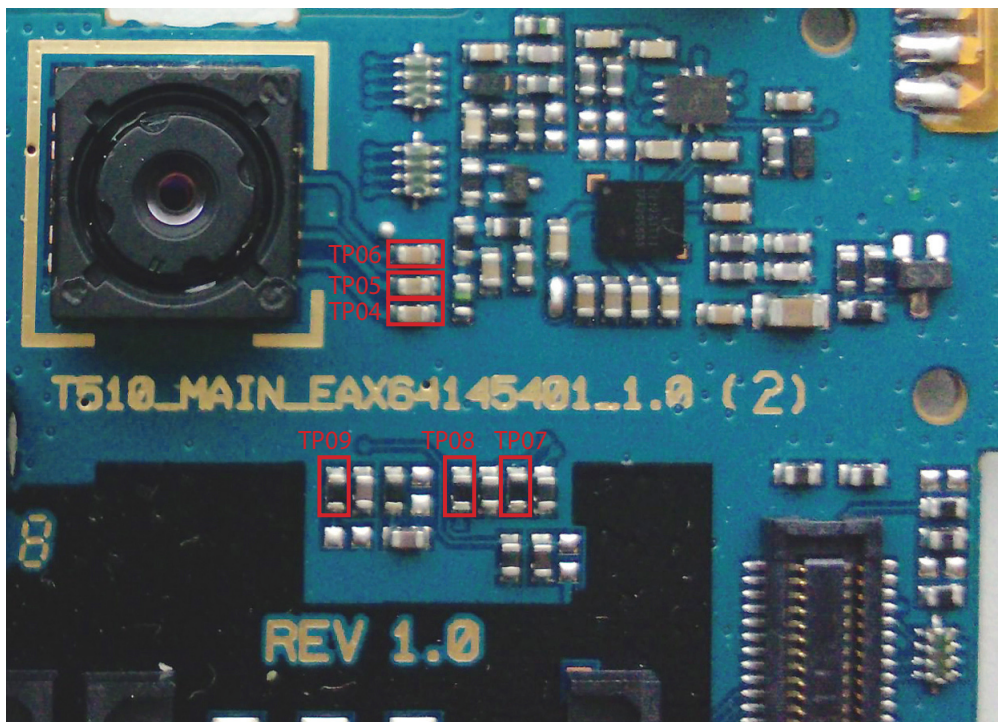
Graph 4.7.2. LCD Data Waveform

CHECKING FLOW



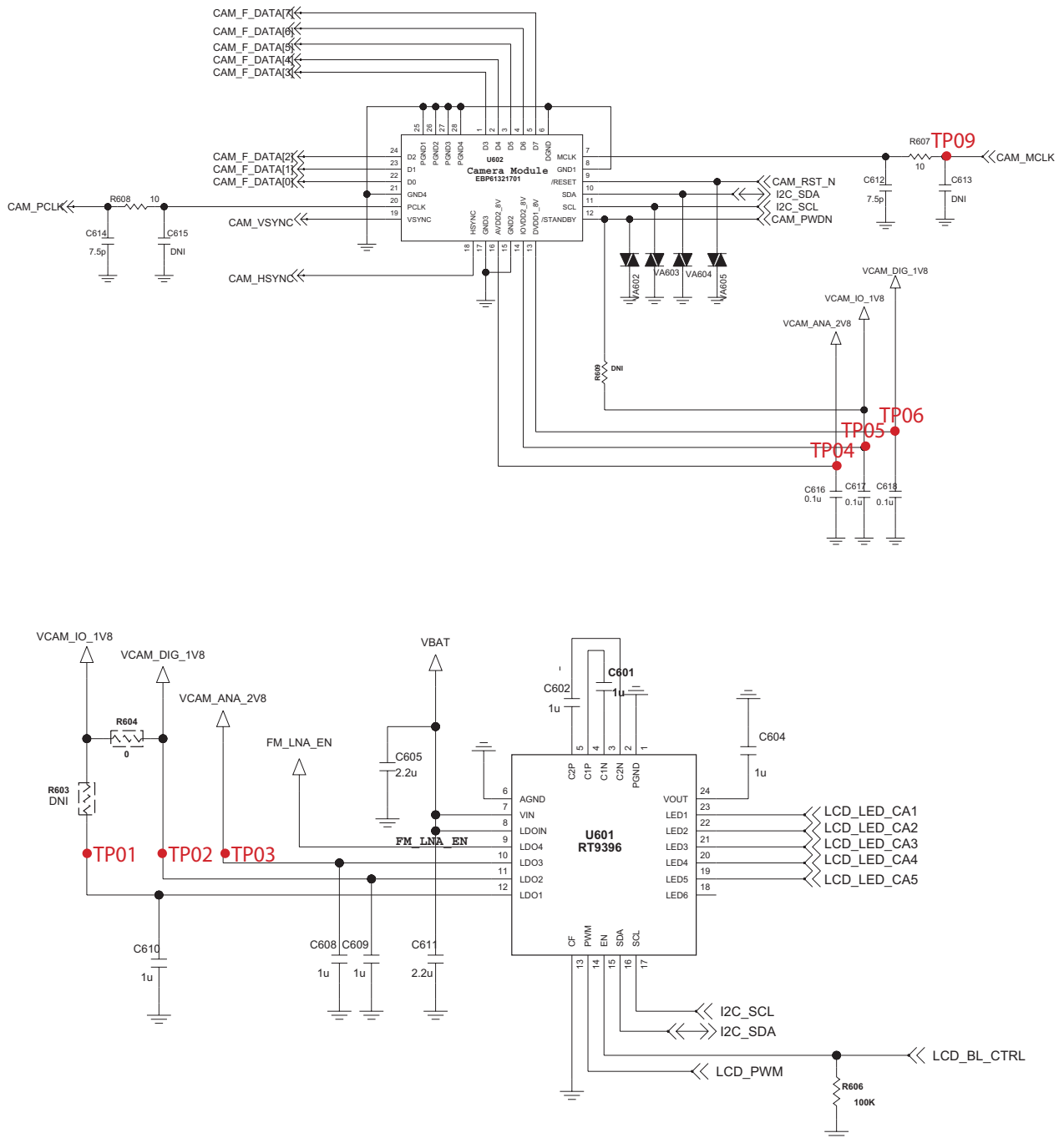
4.8 Camera Trouble

TEST POINT



4. TROUBLE SHOOTING

CIRCUIT

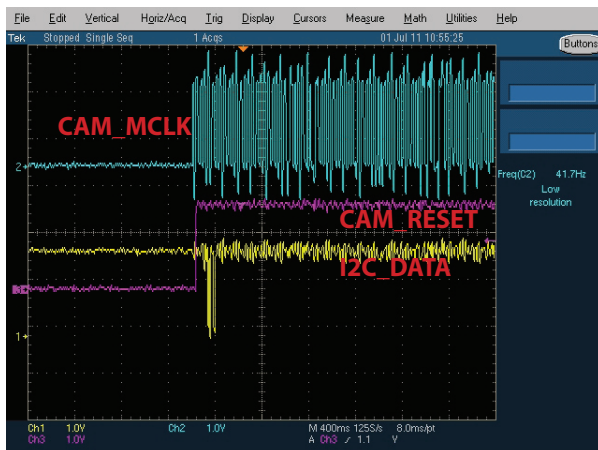


CIRCUIT

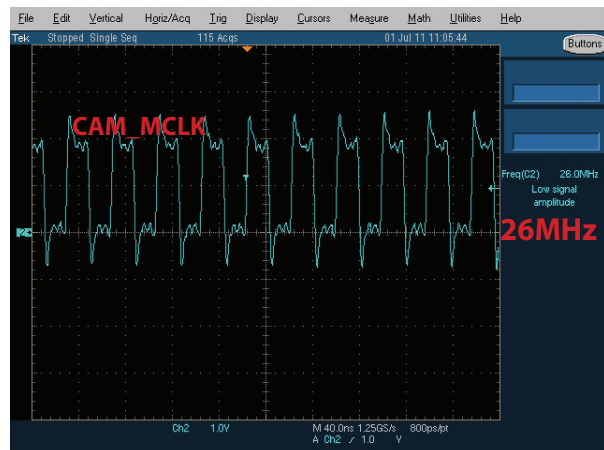


4. TROUBLE SHOOTING

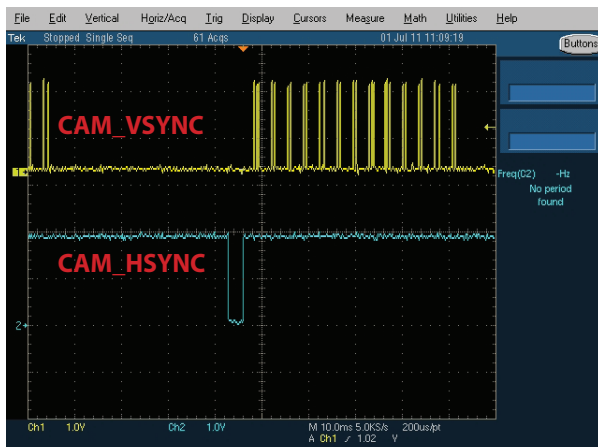
Waveform



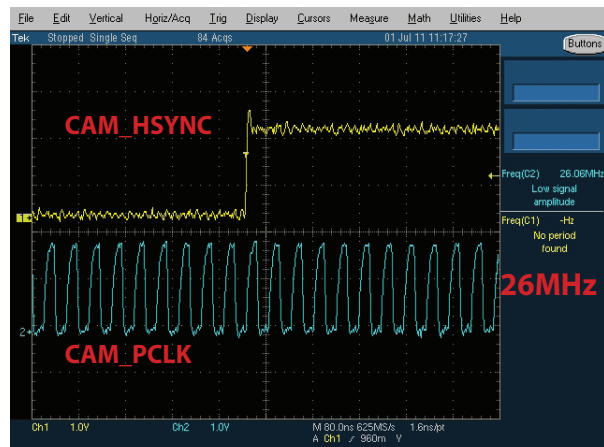
Graph 4.8.1. I2C Data Waveform



Graph 4.8.2. MCLK Waveform

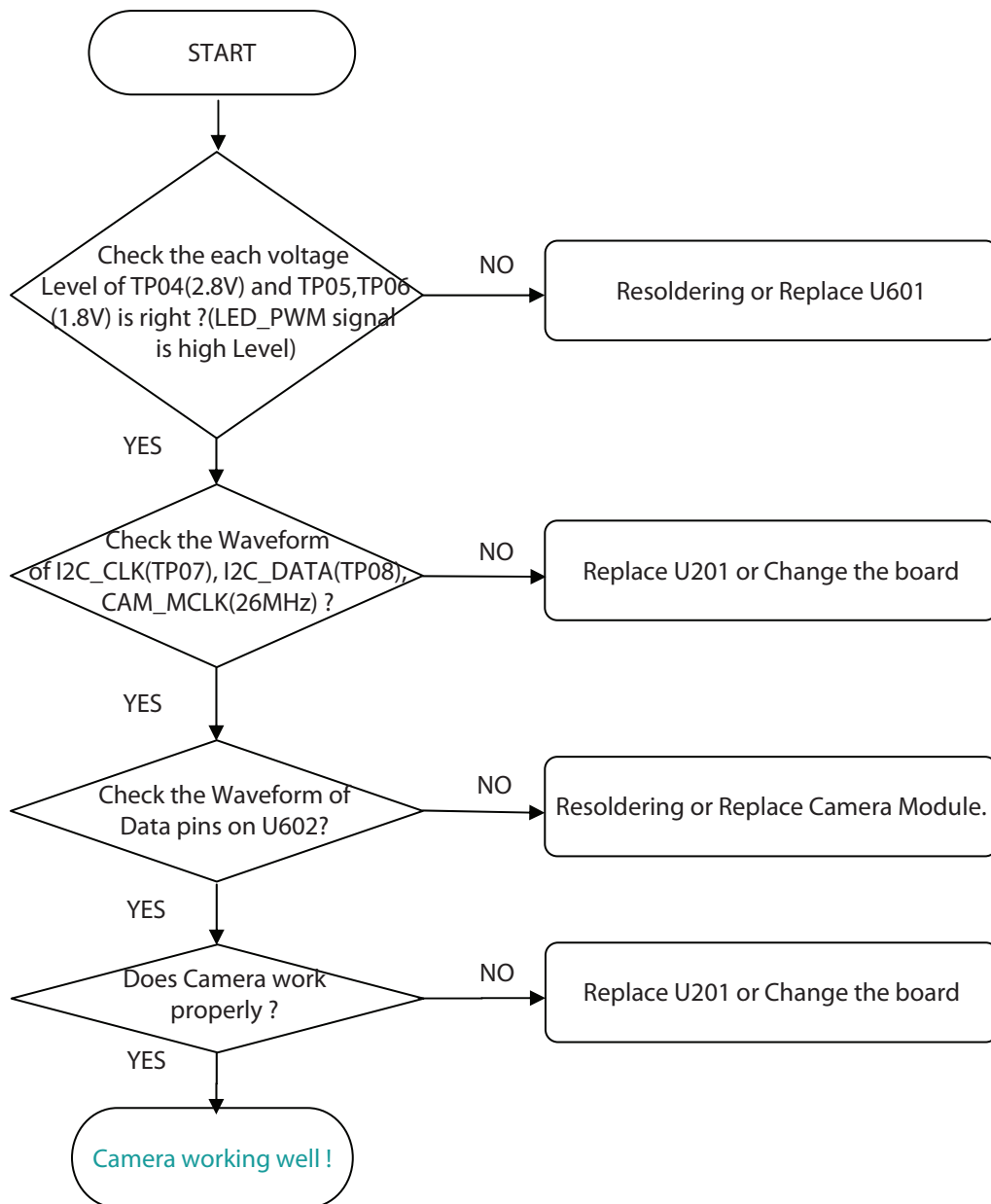


Graph 4.8.3. CAM_VSYNC vs. CAM_HSYNC Waveform



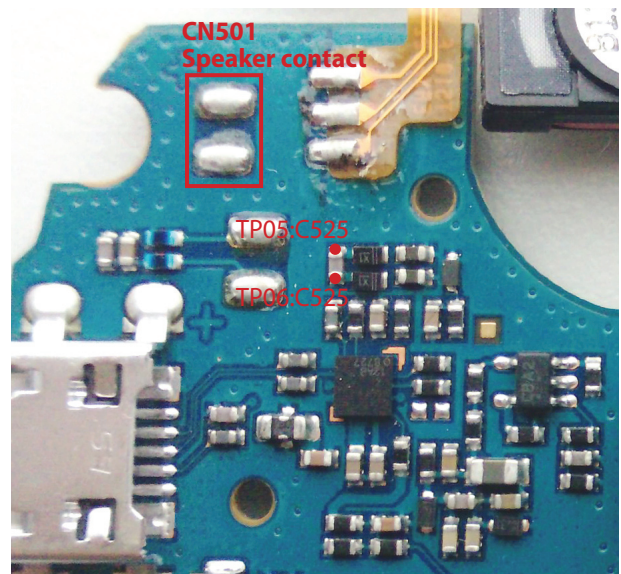
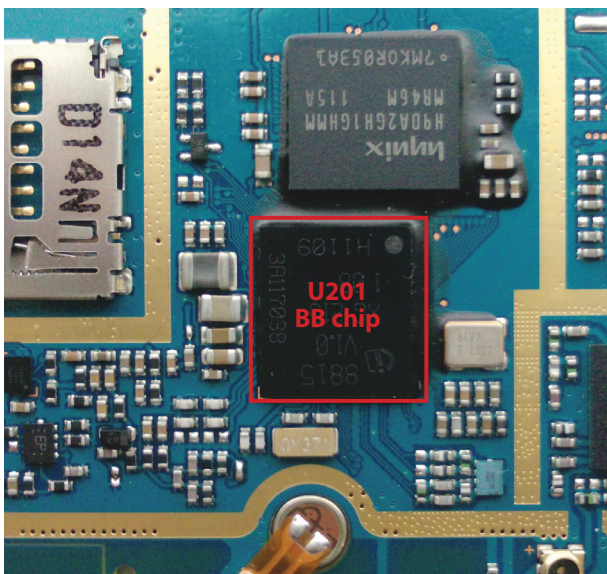
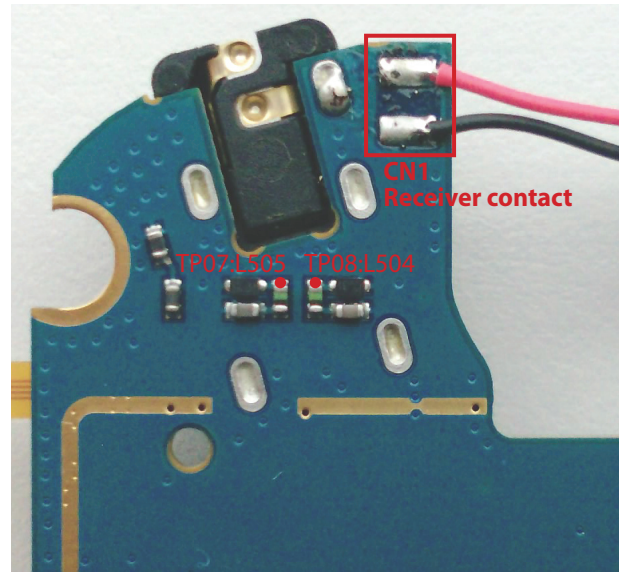
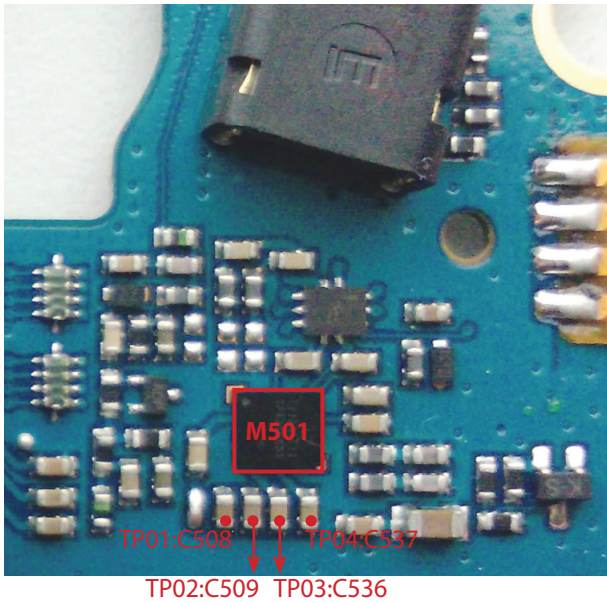
Graph 4.8.4. CAM_HSYNC vs. CAM_PCLK Waveform

CHECKING FLOW

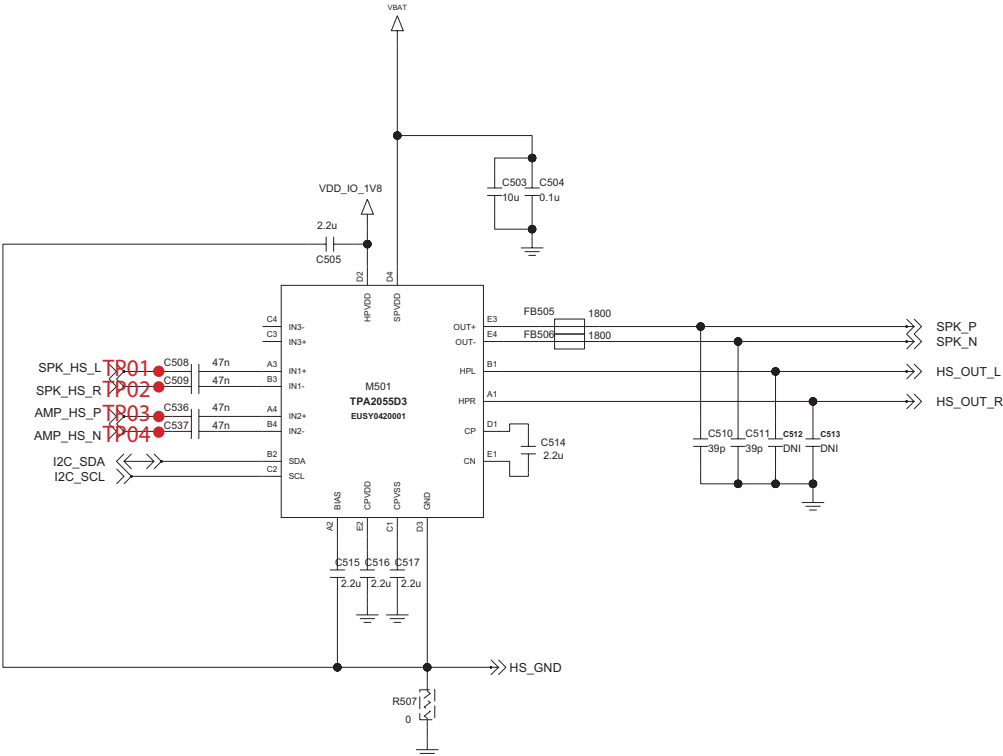


4.9 Speaker / Receiver Trouble

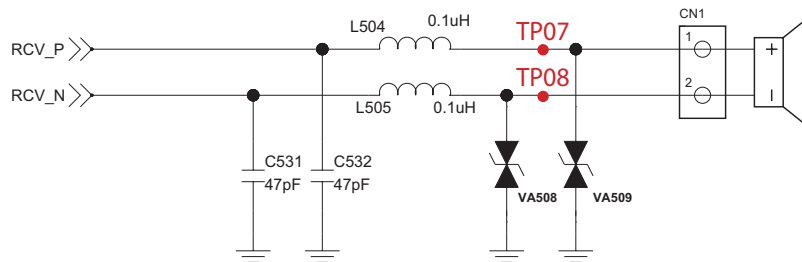
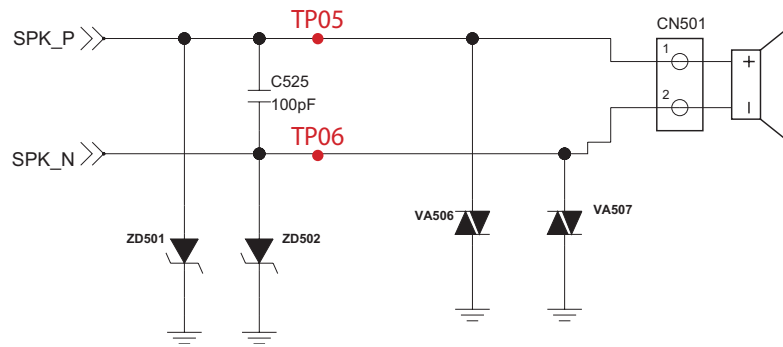
TEST POINT



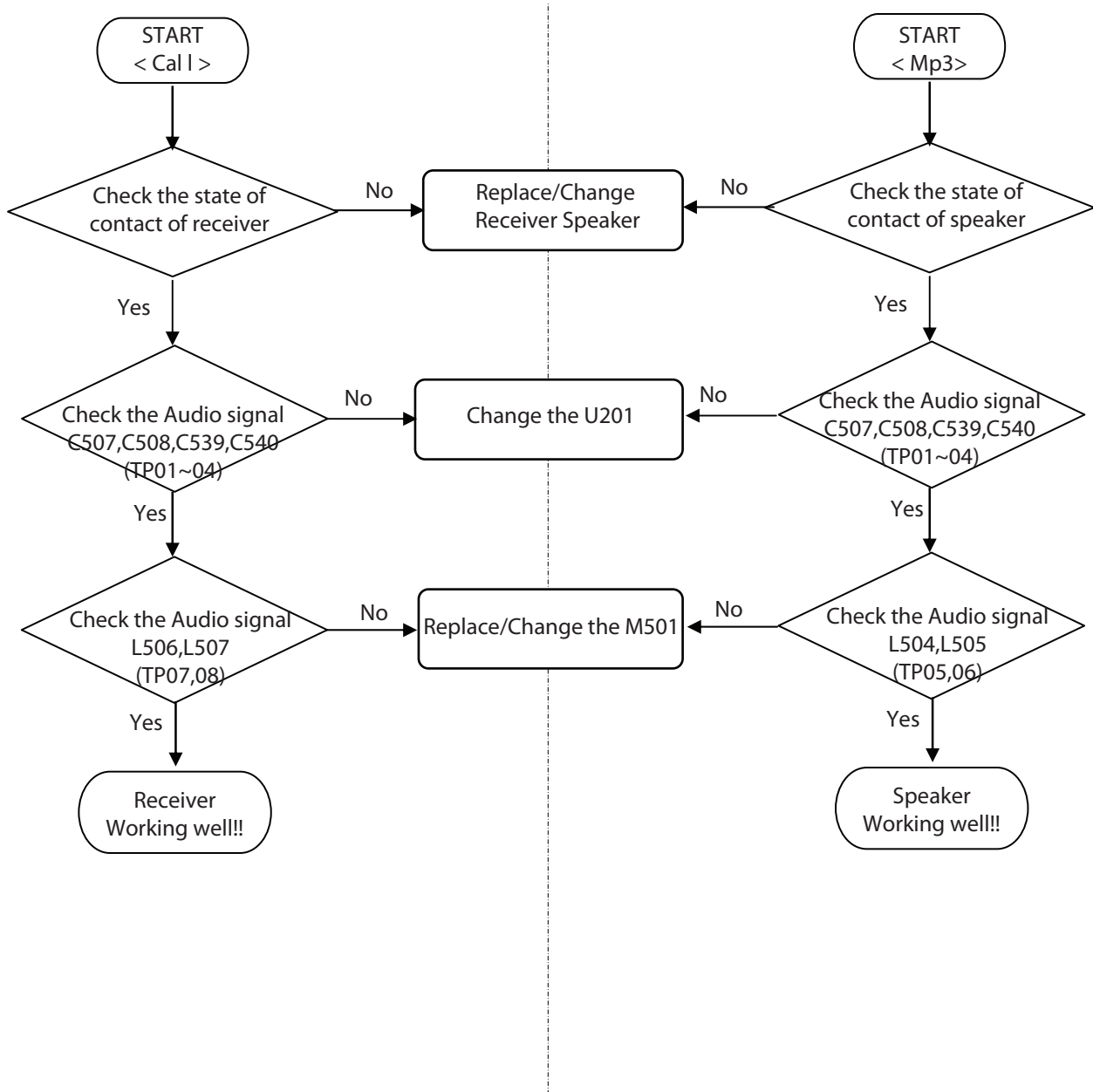
CIRCUIT



CIRCUIT

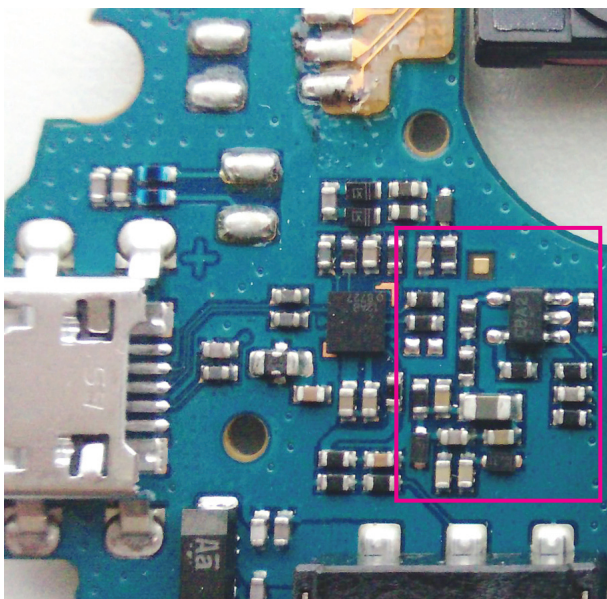
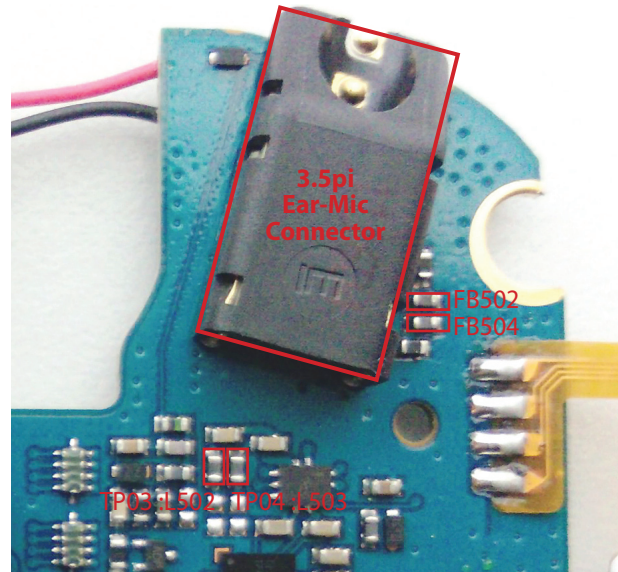
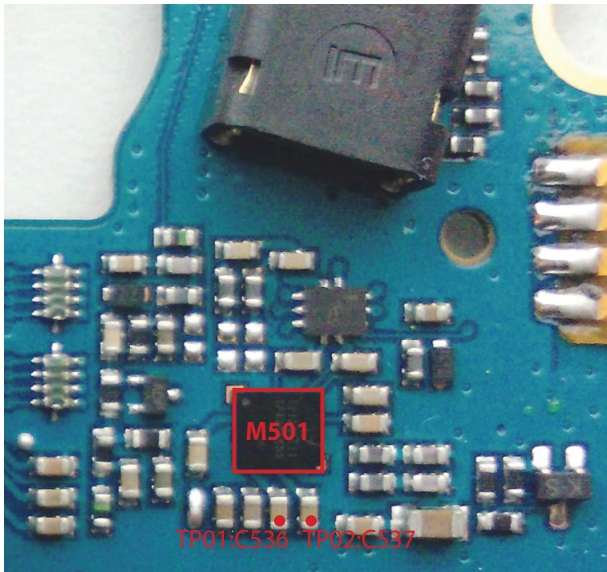


CHECKING FLOW



4.10 Earphone Trouble

TEST POINT



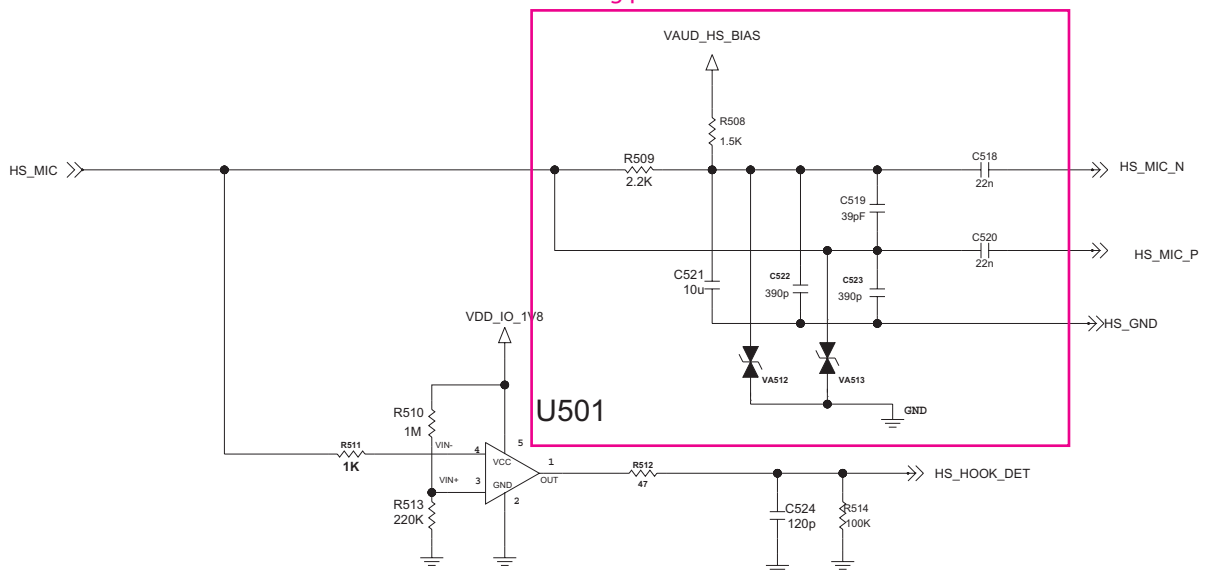
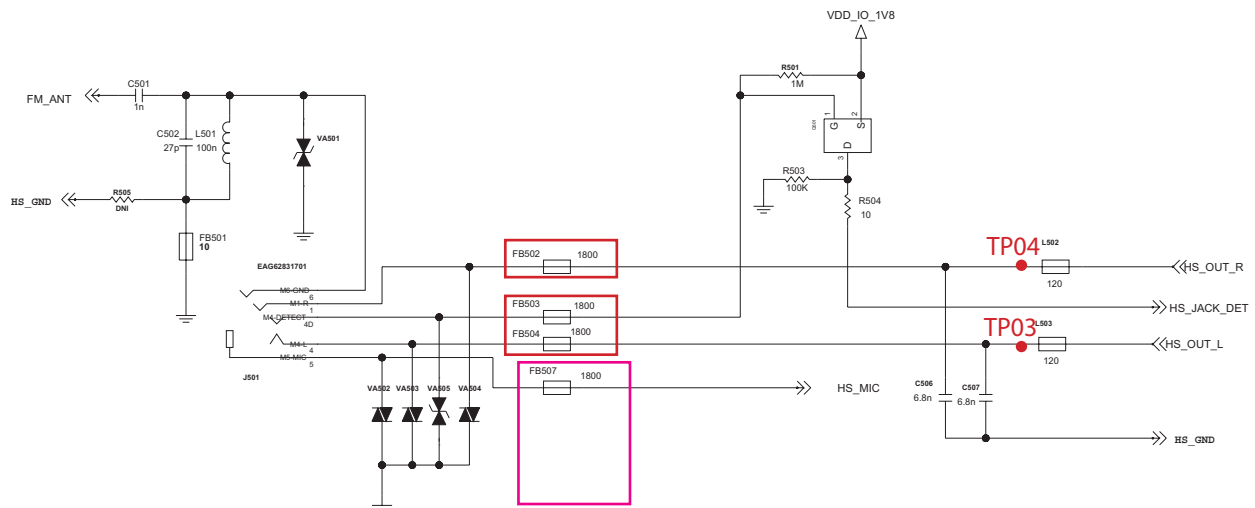
Headset MIC
Resoldering points

CIRCUIT

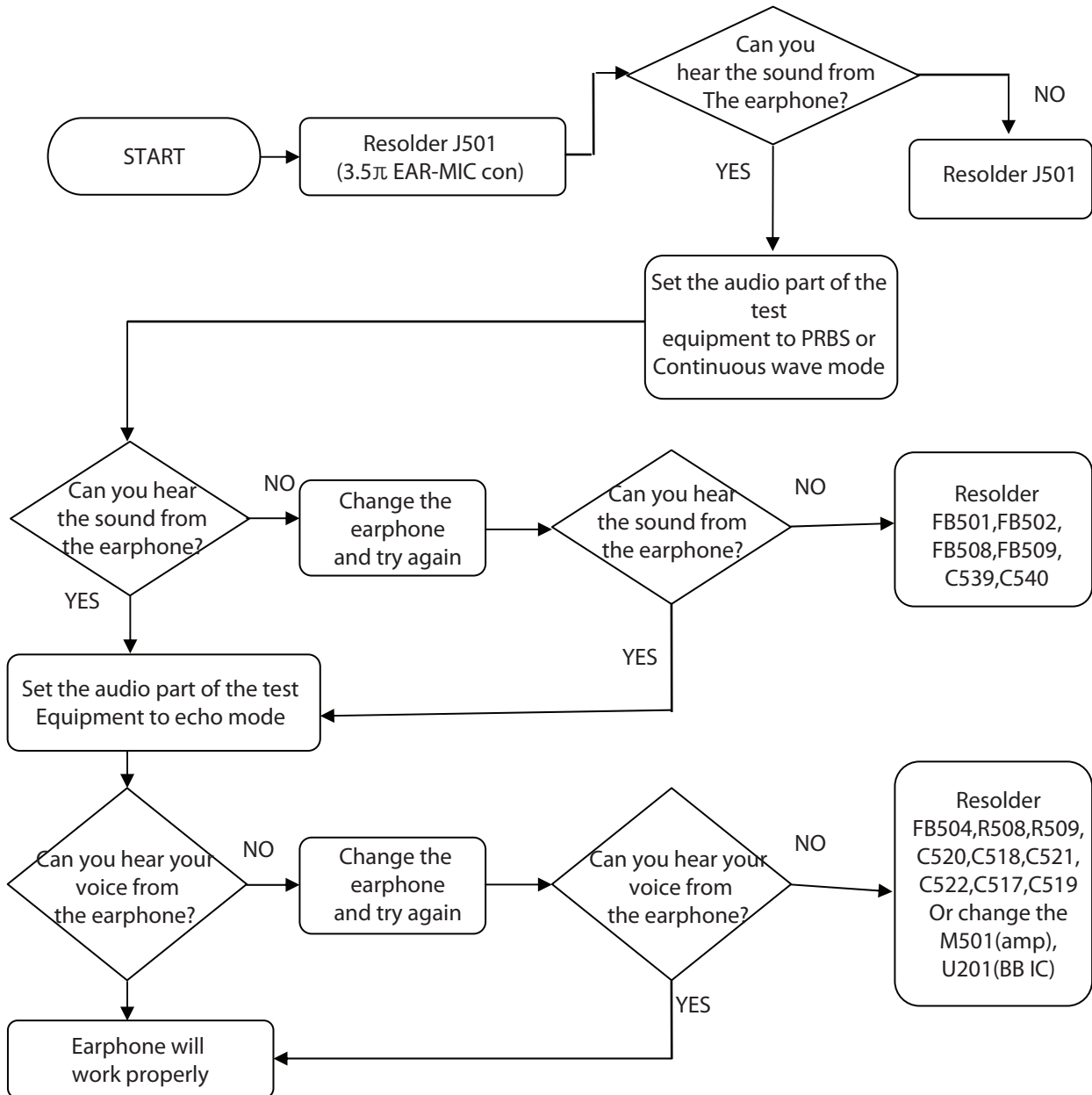


4. TROUBLE SHOOTING

CIRCUIT

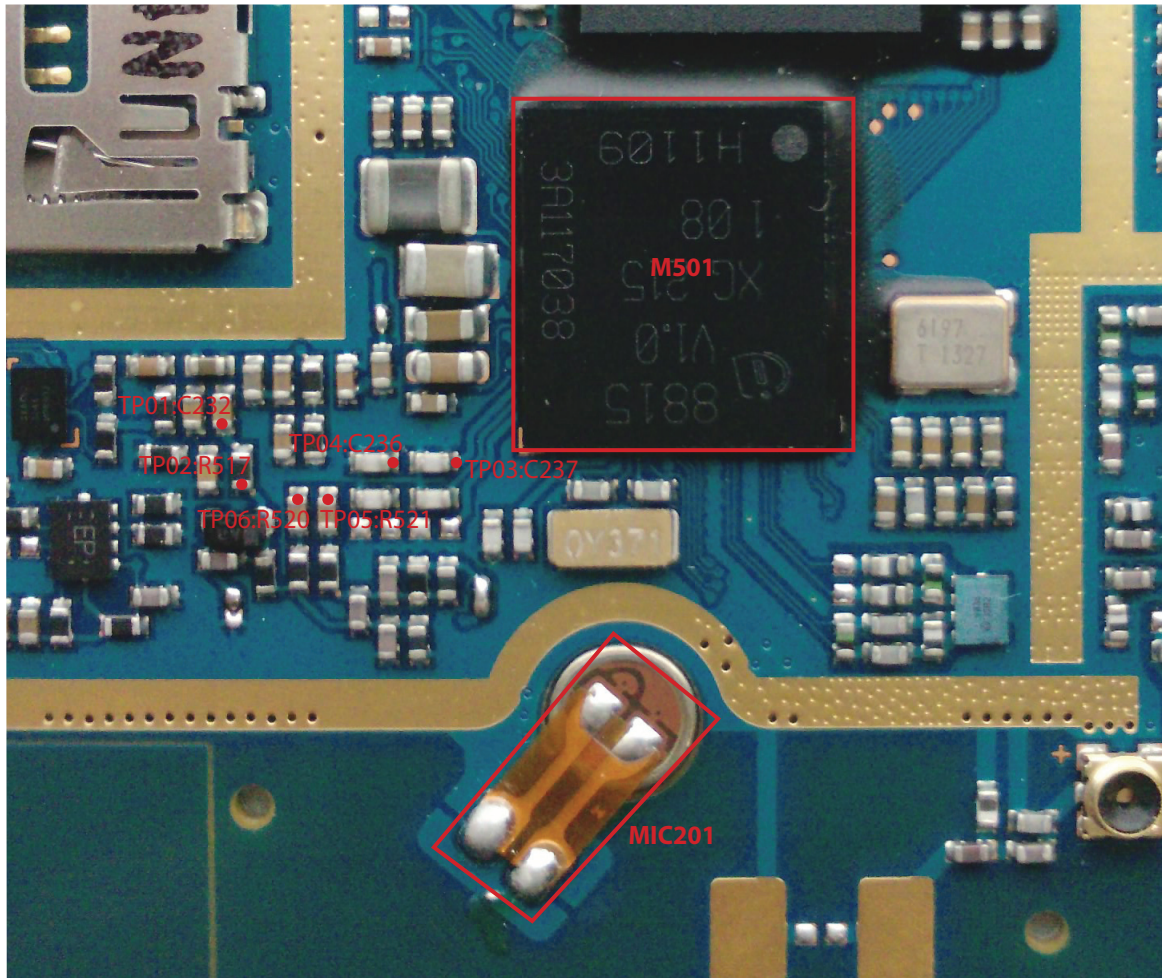


CHECKING FLOW



4.11 Microphone Trouble

TEST POINT

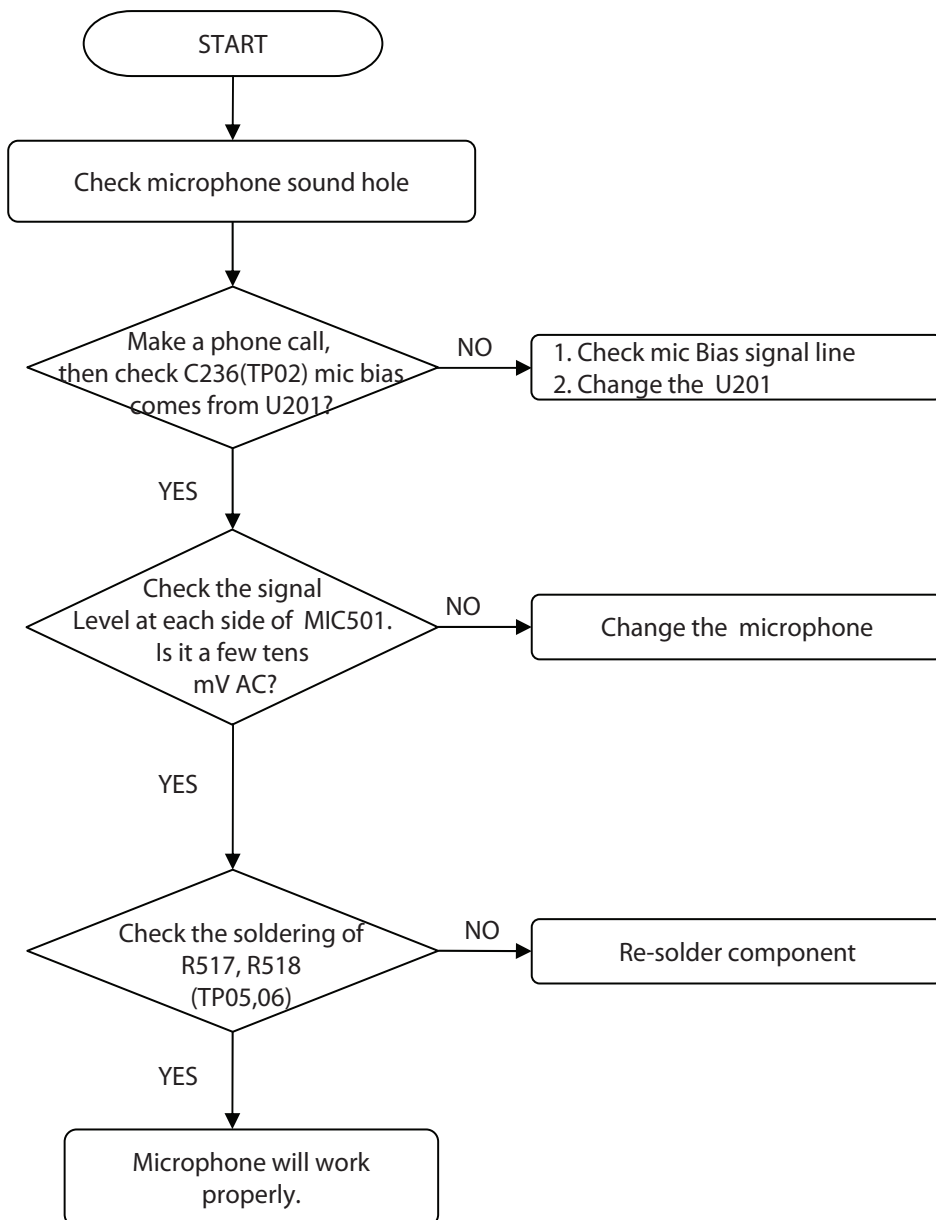


CIRCUIT



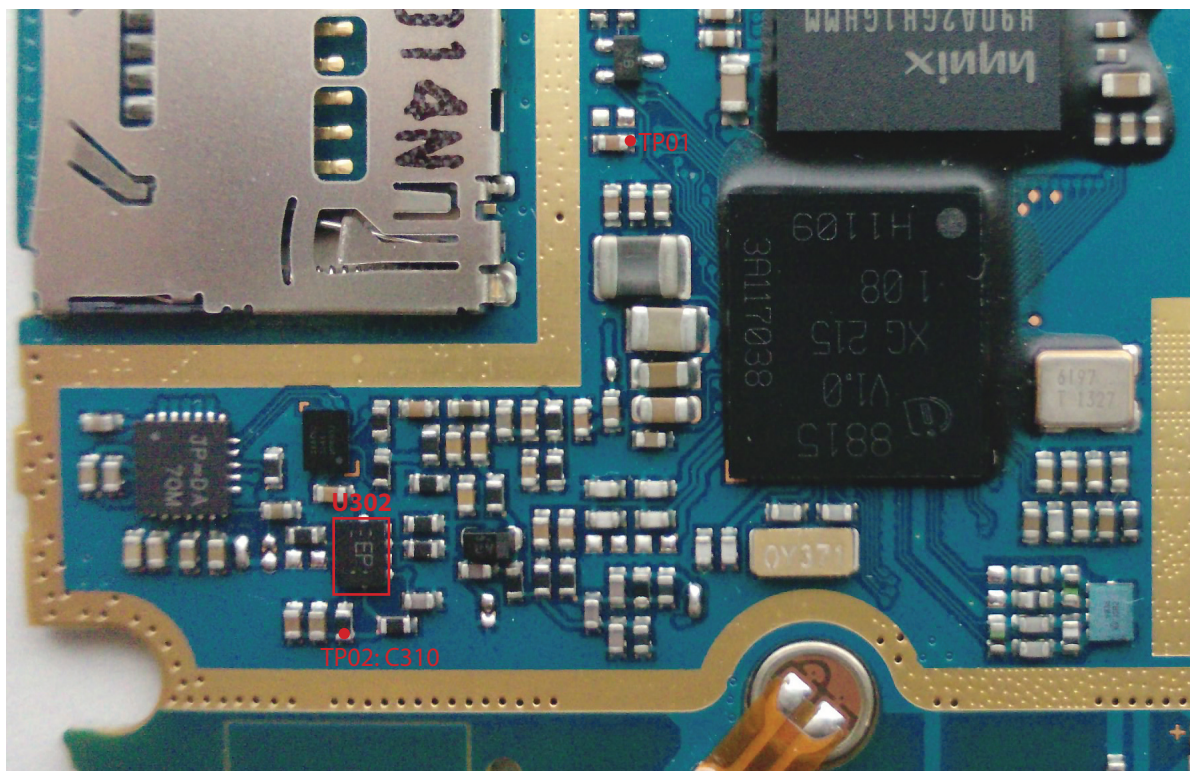
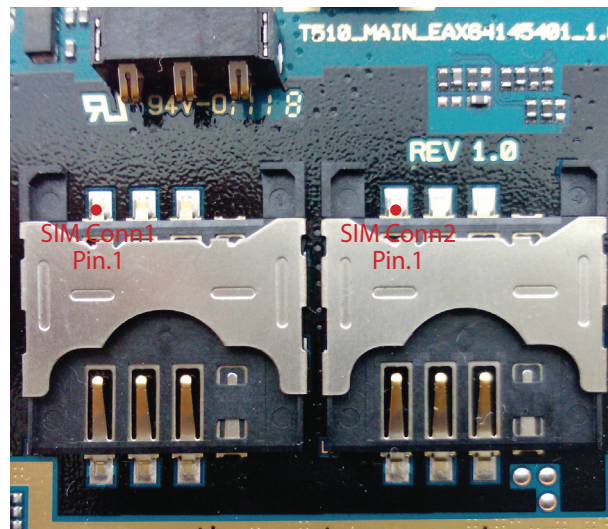
CHECKING FLOW

SETTING : After initialize Agilent 8960, Test EGSM900, DCS mode (or GSM850, PCS mode)



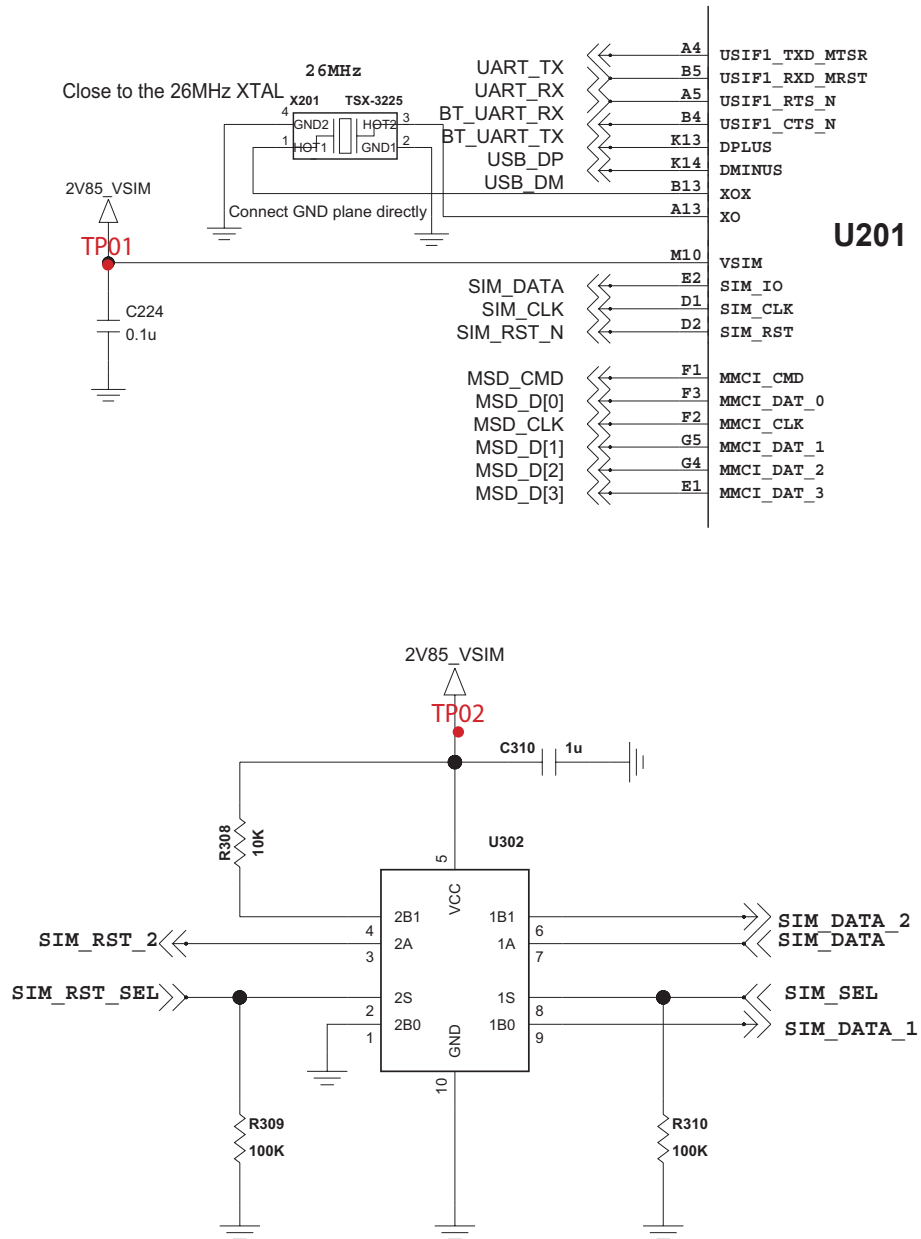
4.12 SIM Card Interface Trouble

TEST POINT

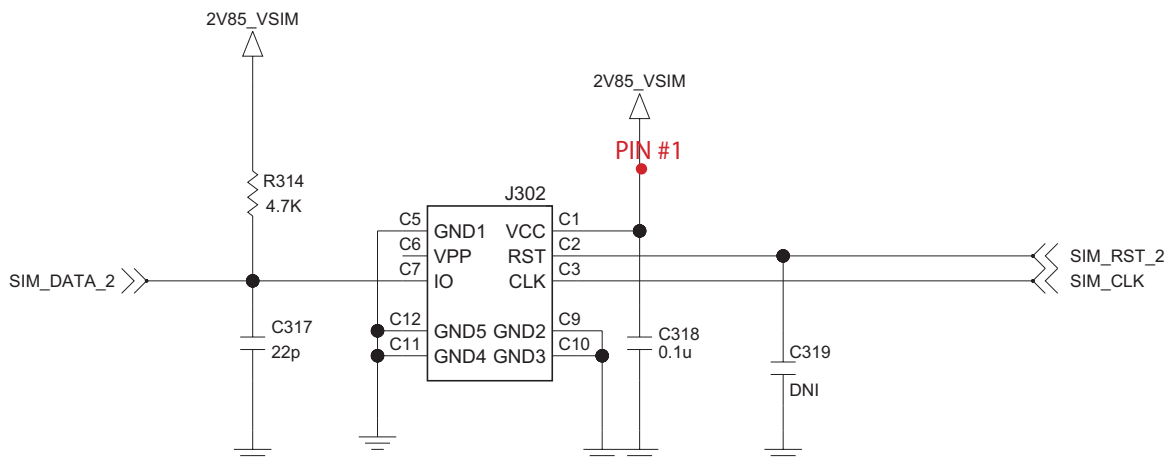
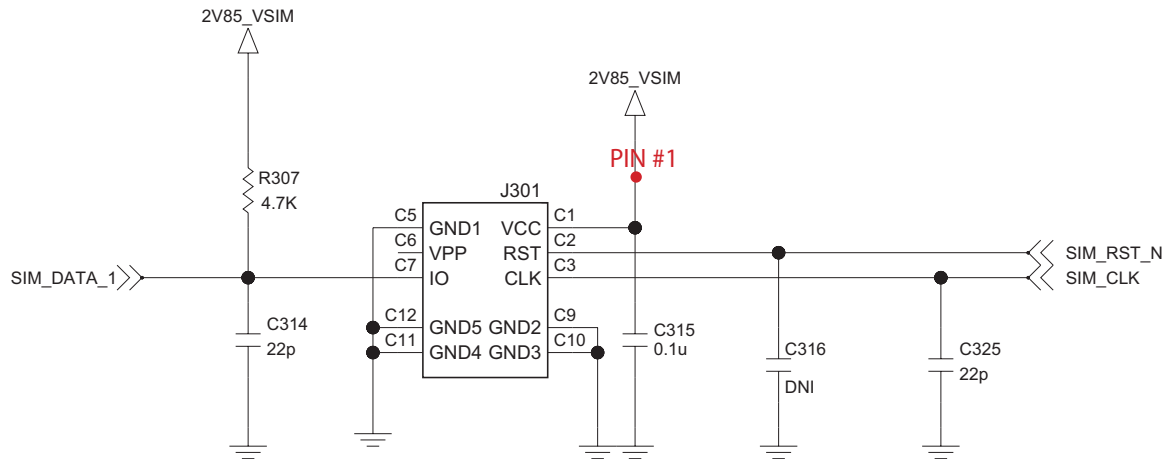


4. TROUBLE SHOOTING

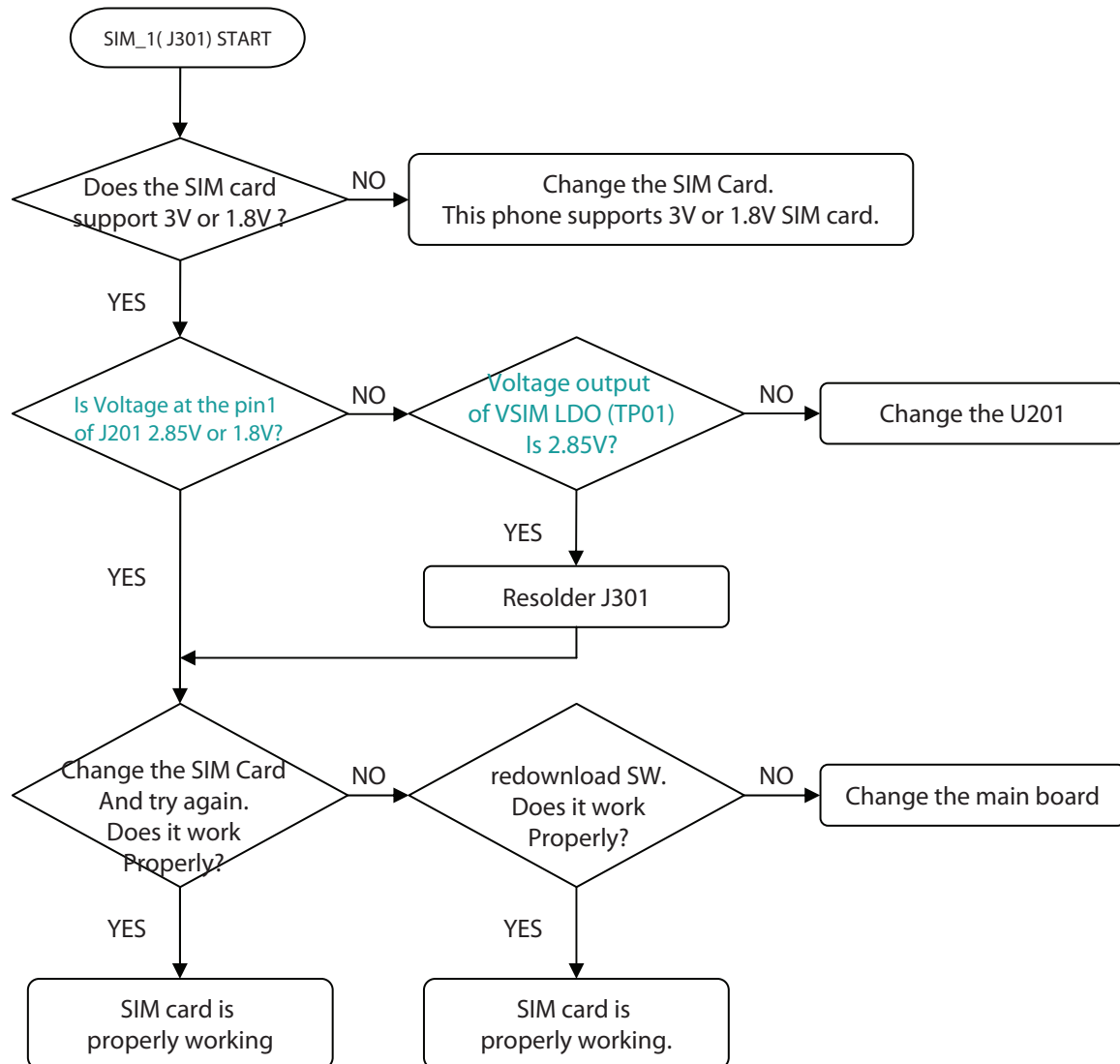
CIRCUIT



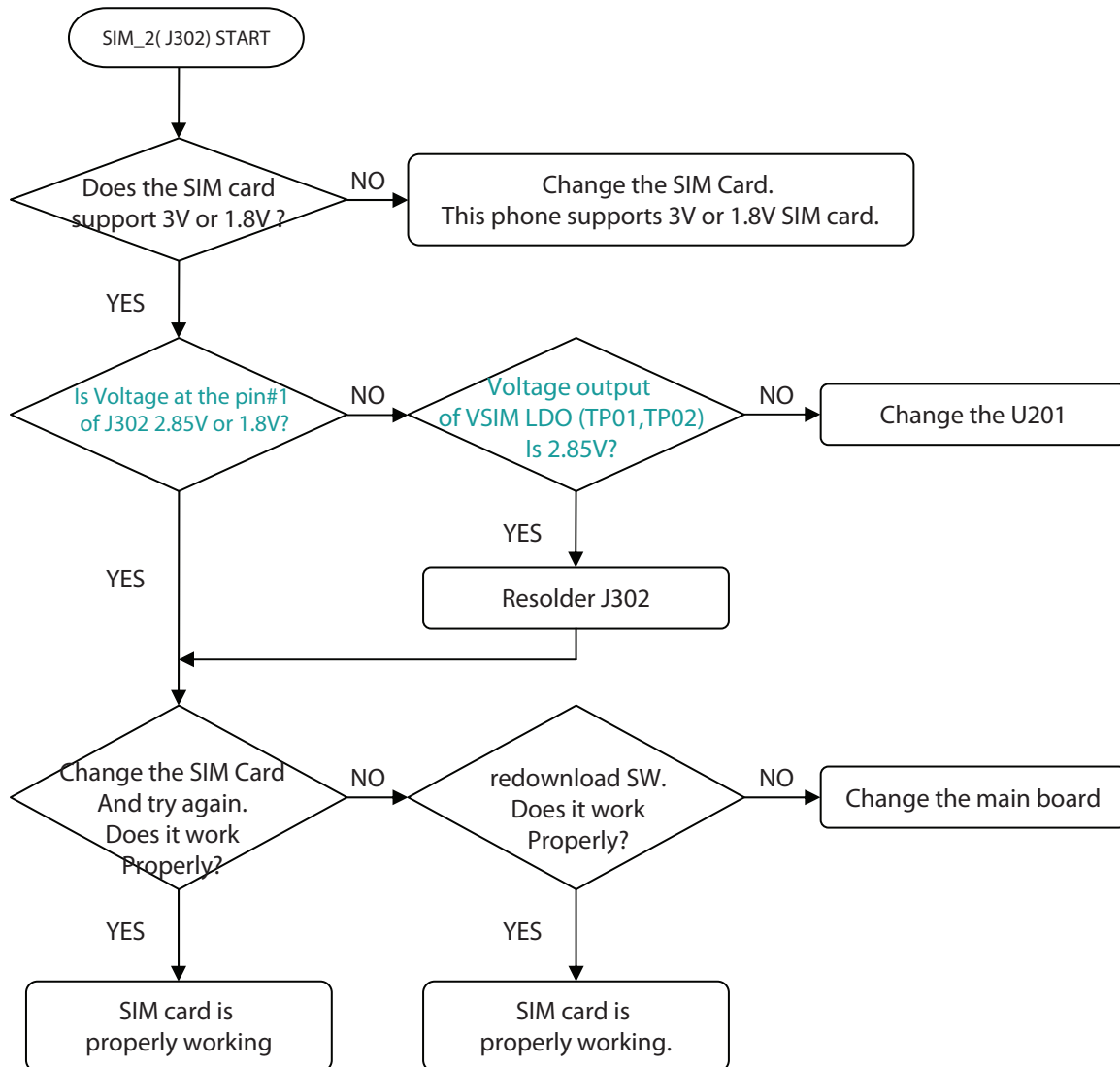
CIRCUIT



CHECKING FLOW

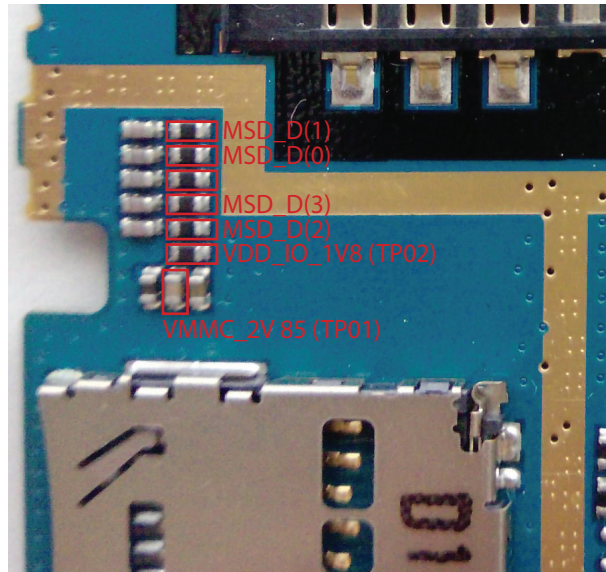


CHECKING FLOW

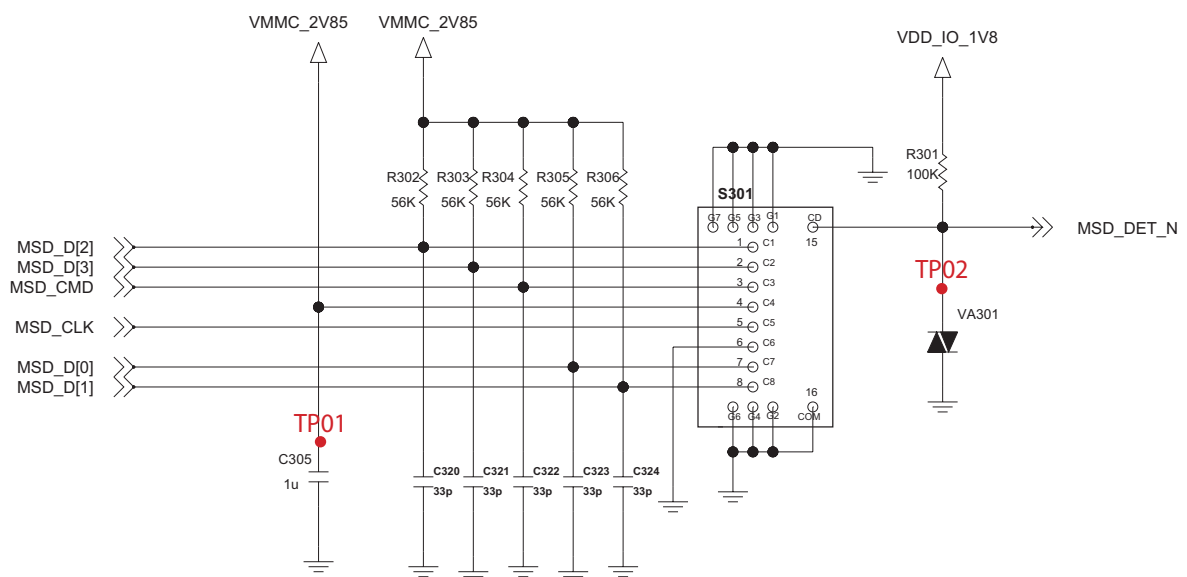


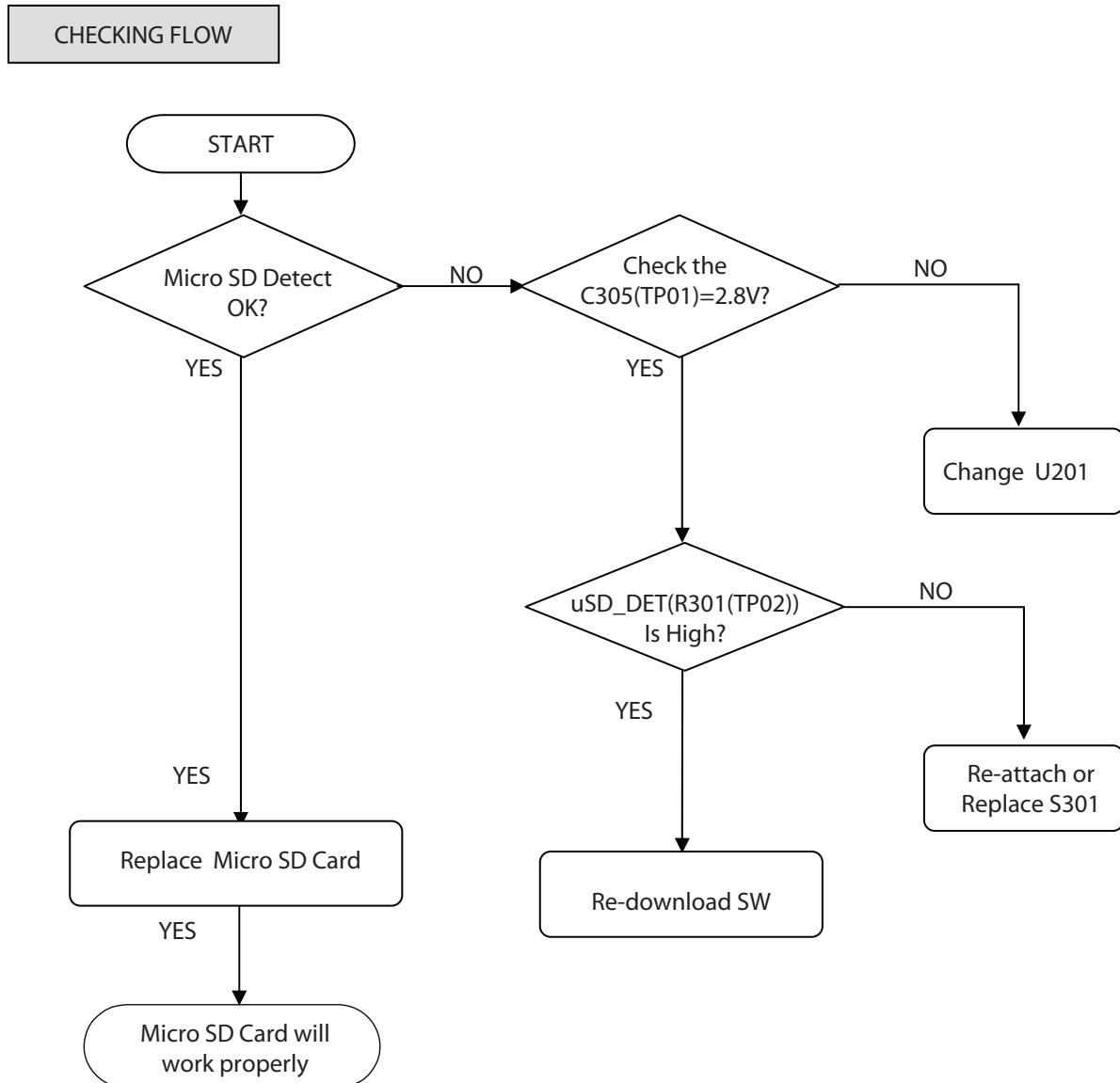
4.13 Micro SD (uSD) Trouble

TEST POINT



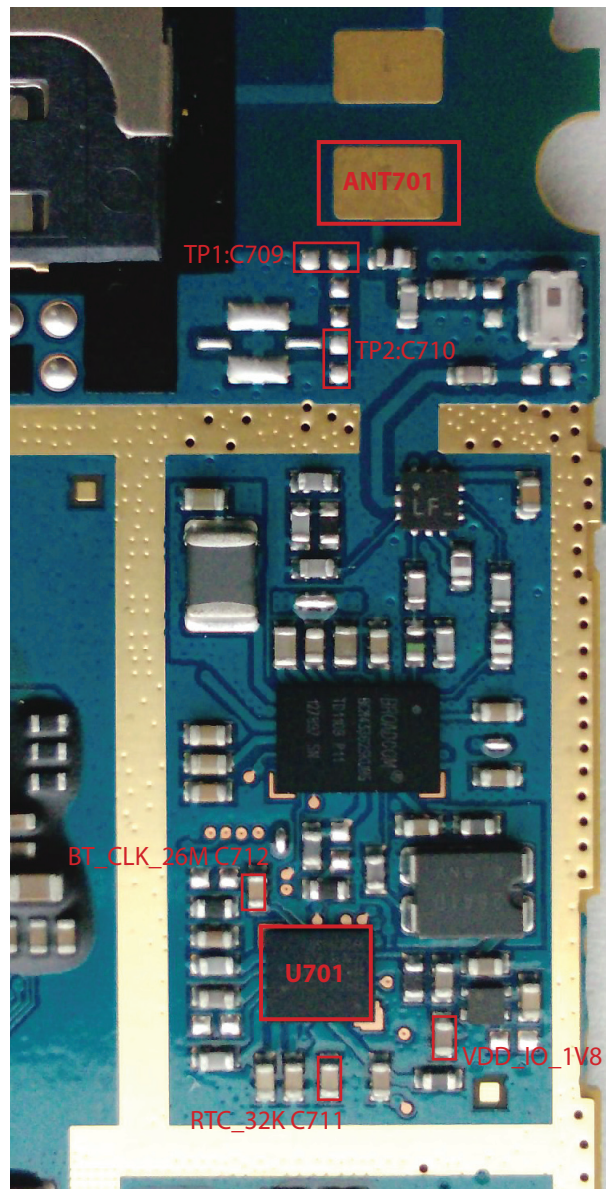
TEST POINT





4.14 Bluetooth Trouble

TEST POINT

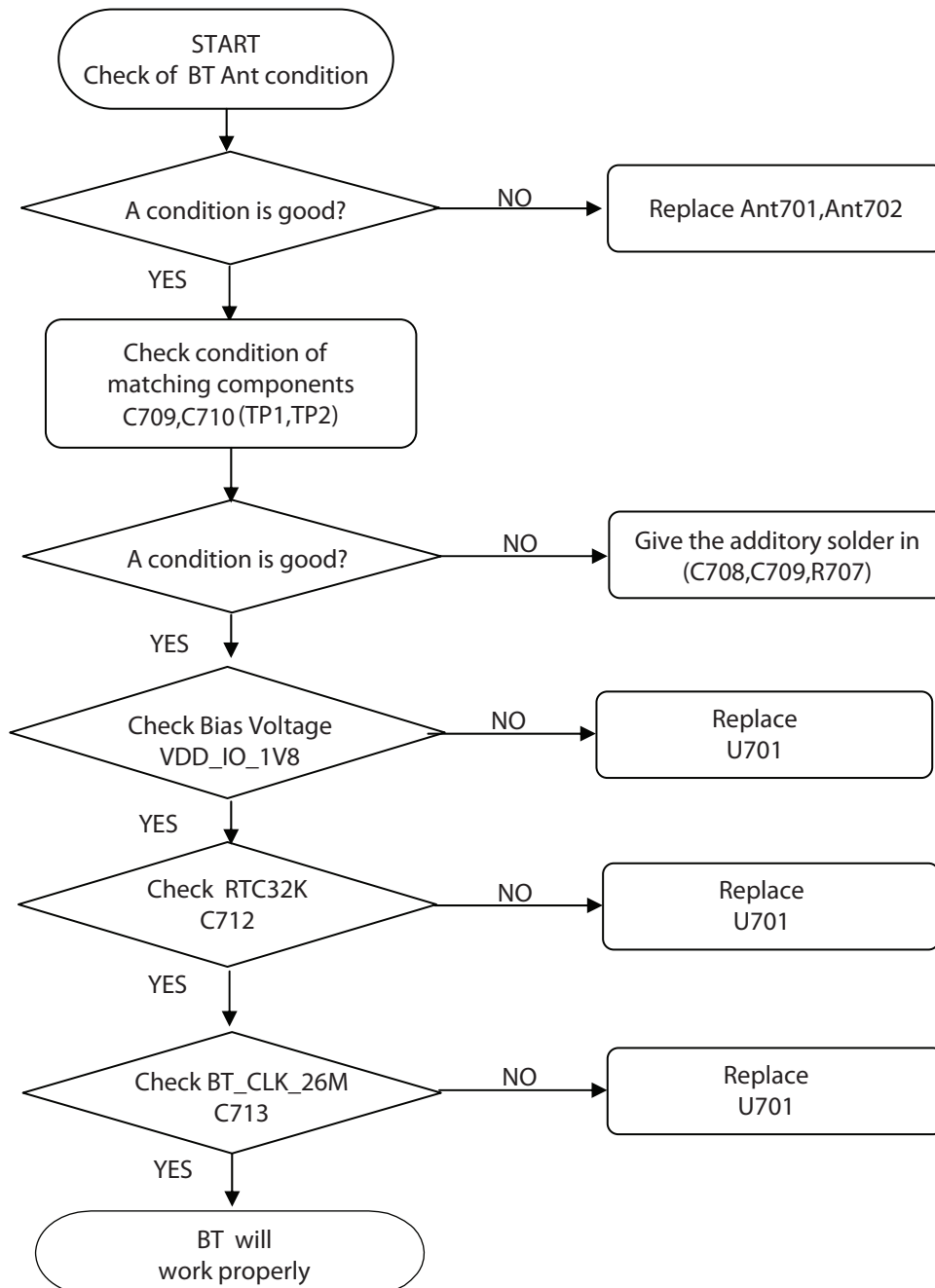


TEST POINT

VBT_IO_1V8	QCT	VREG_MSME_1V8
	IFX	VIO_1V8
VBT_PA_2V6	QCT	VREG_MSMP_2V6
	IFX	VPA_2V85

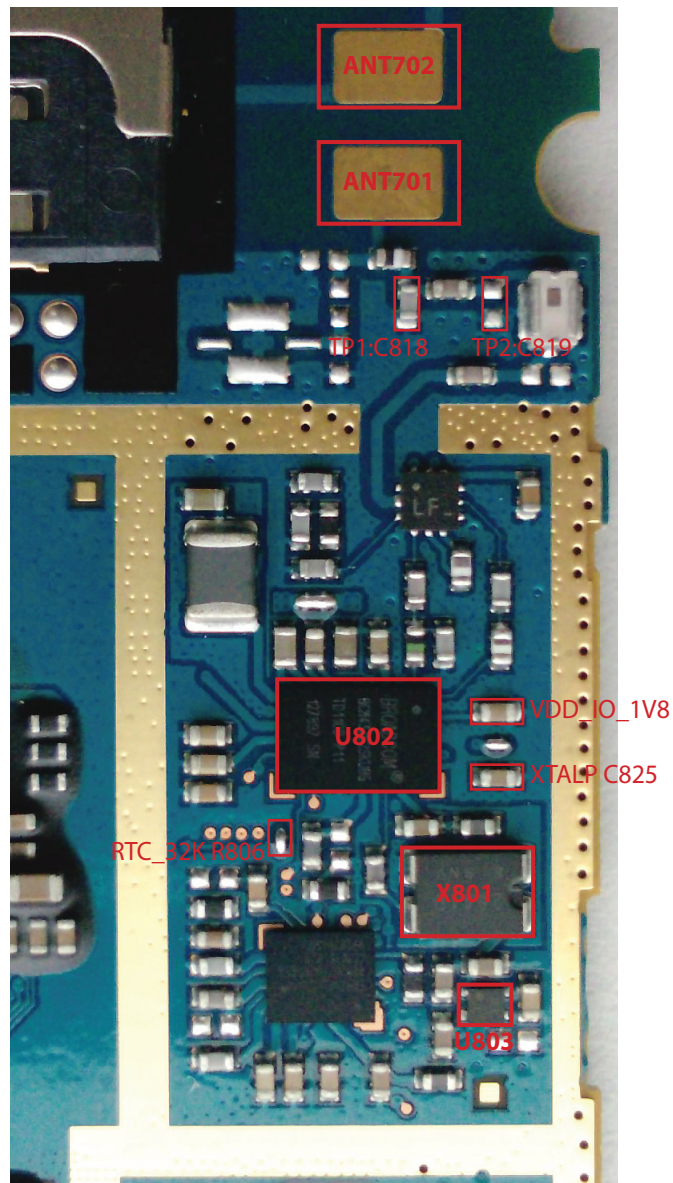


CHECKING FLOW



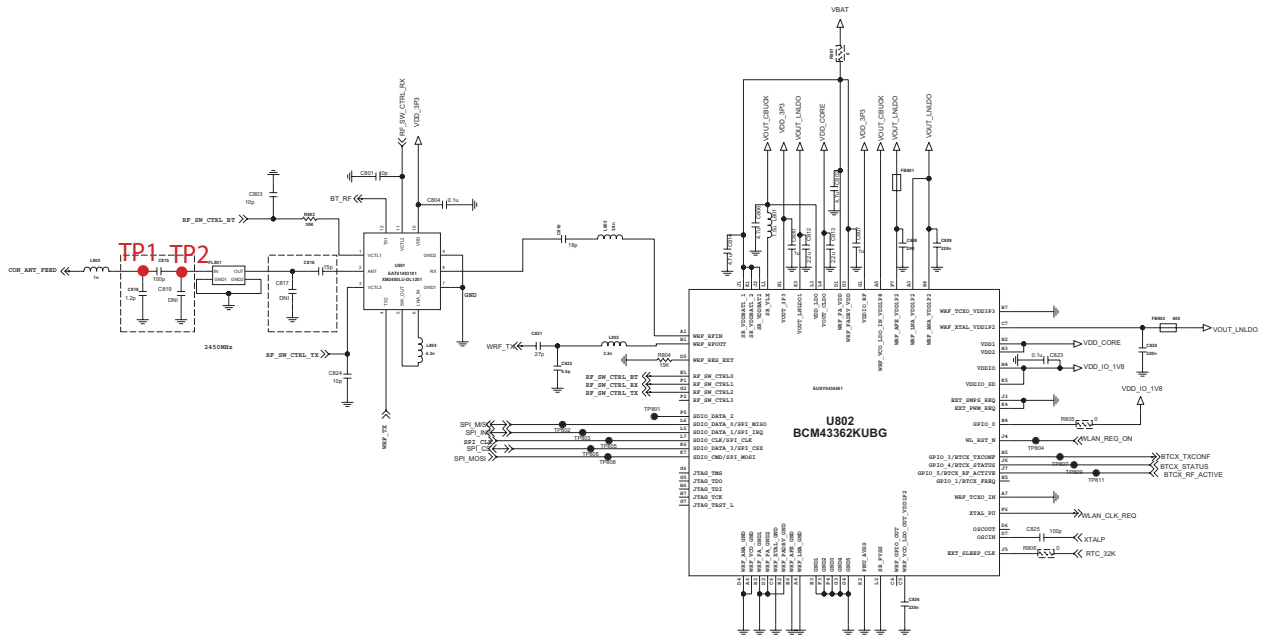
4.15 Wifi Trouble

TEST POINT

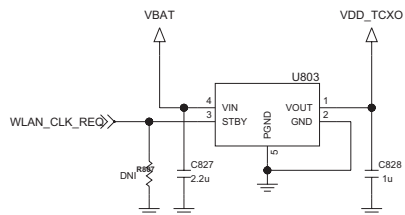


4. TROUBLE SHOOTING

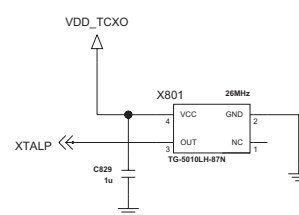
TEST POINT



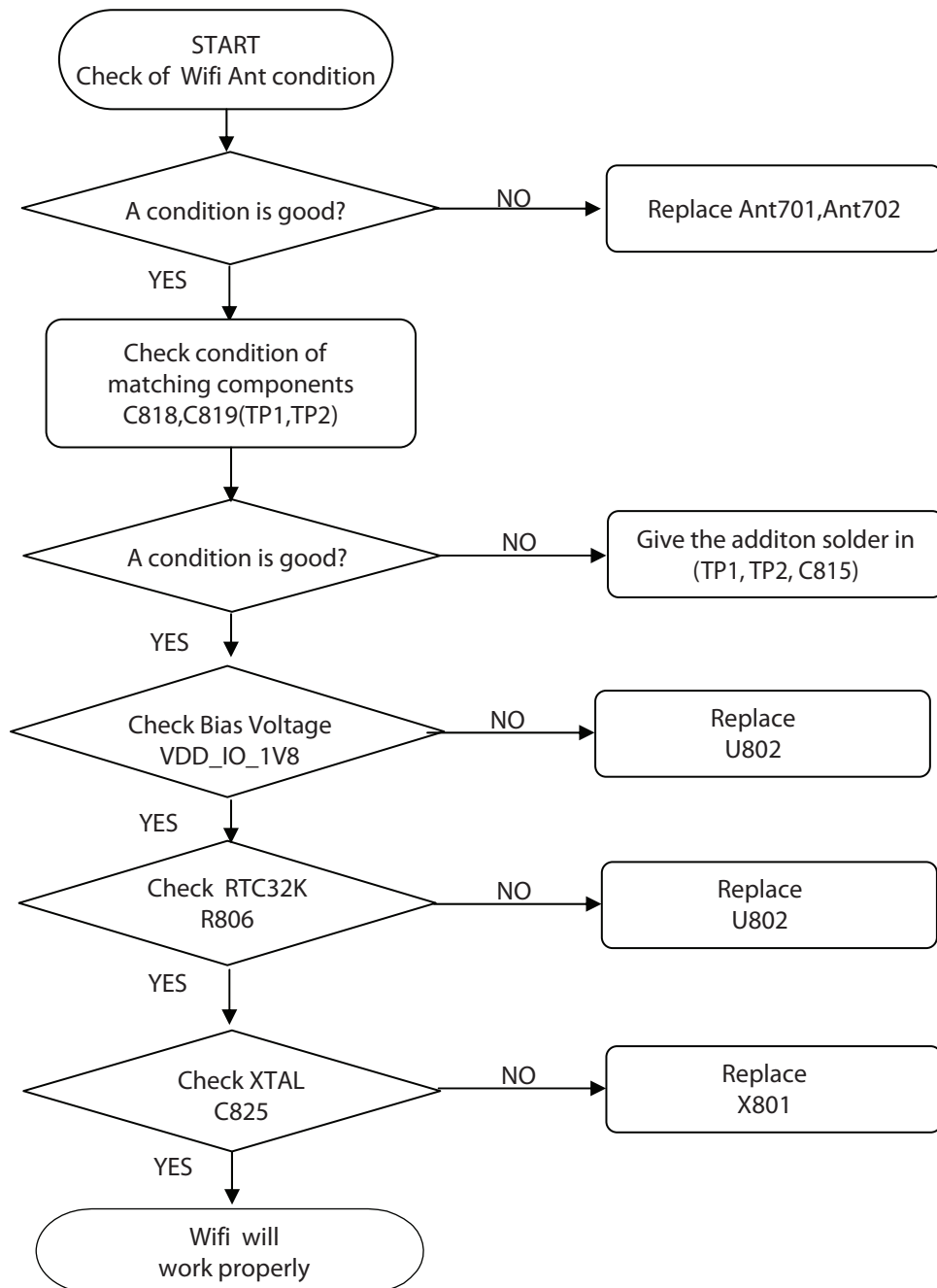
TCXO LDO



WiFi TCXO

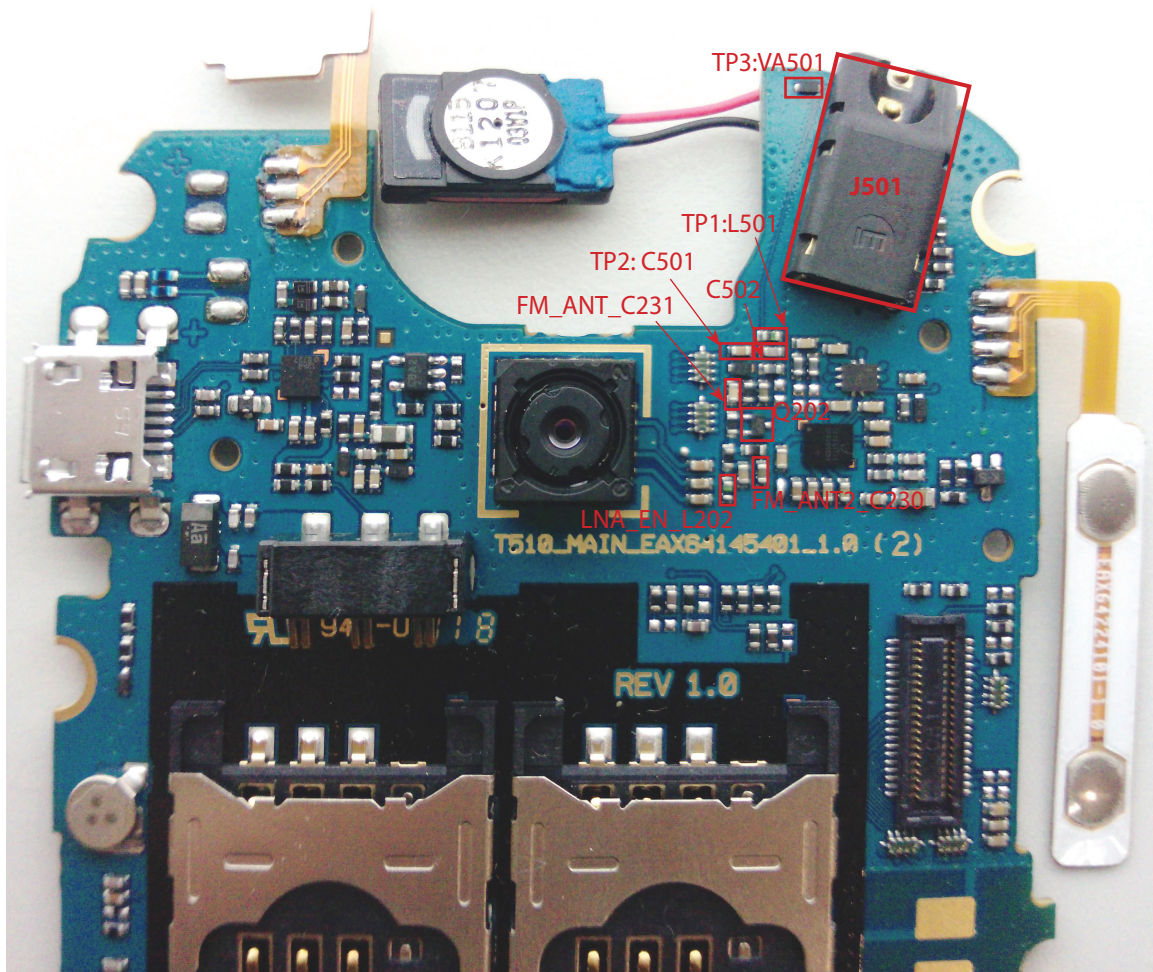


CHECKING FLOW

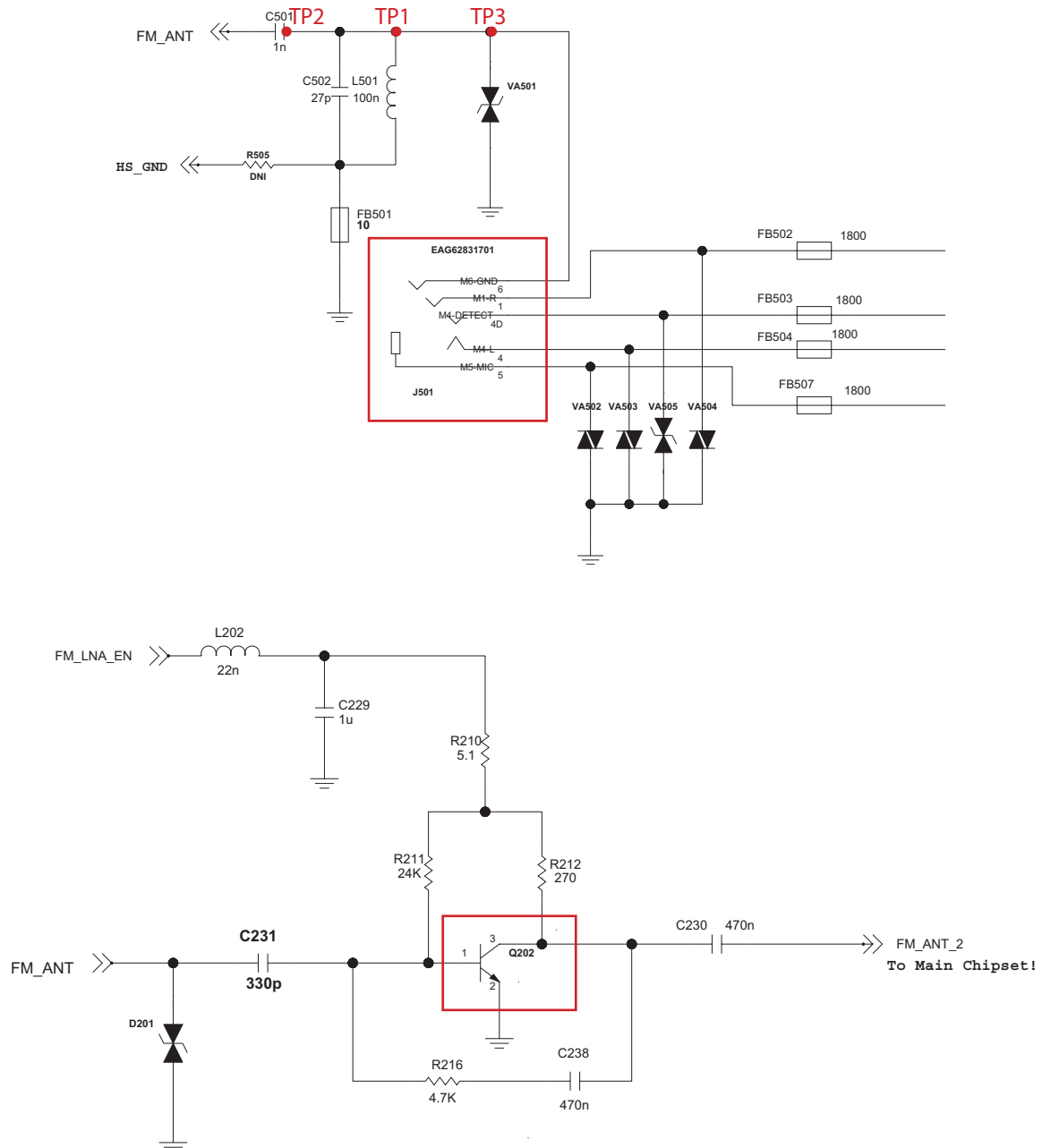


4.16 FM Radio Trouble

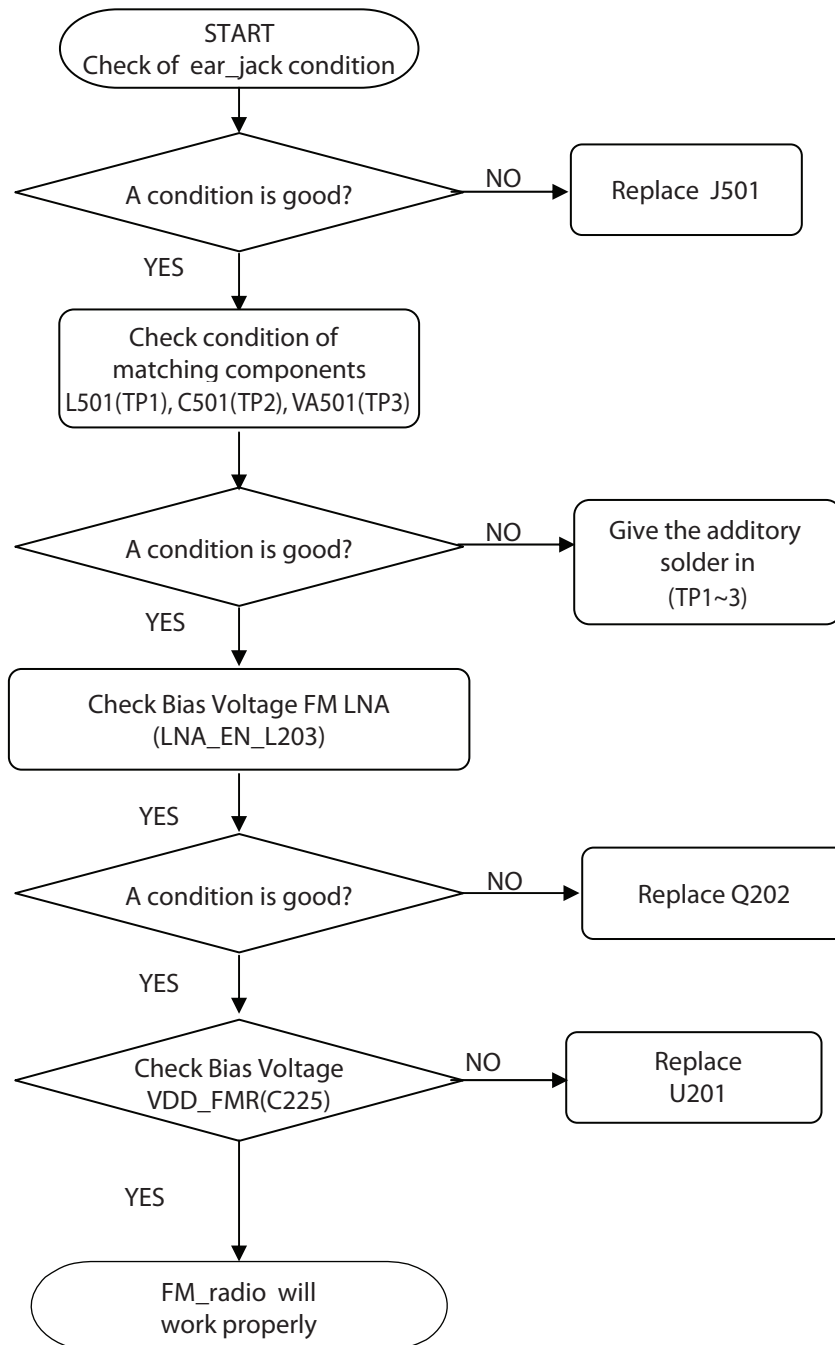
TEST POINT



CIRCUIT

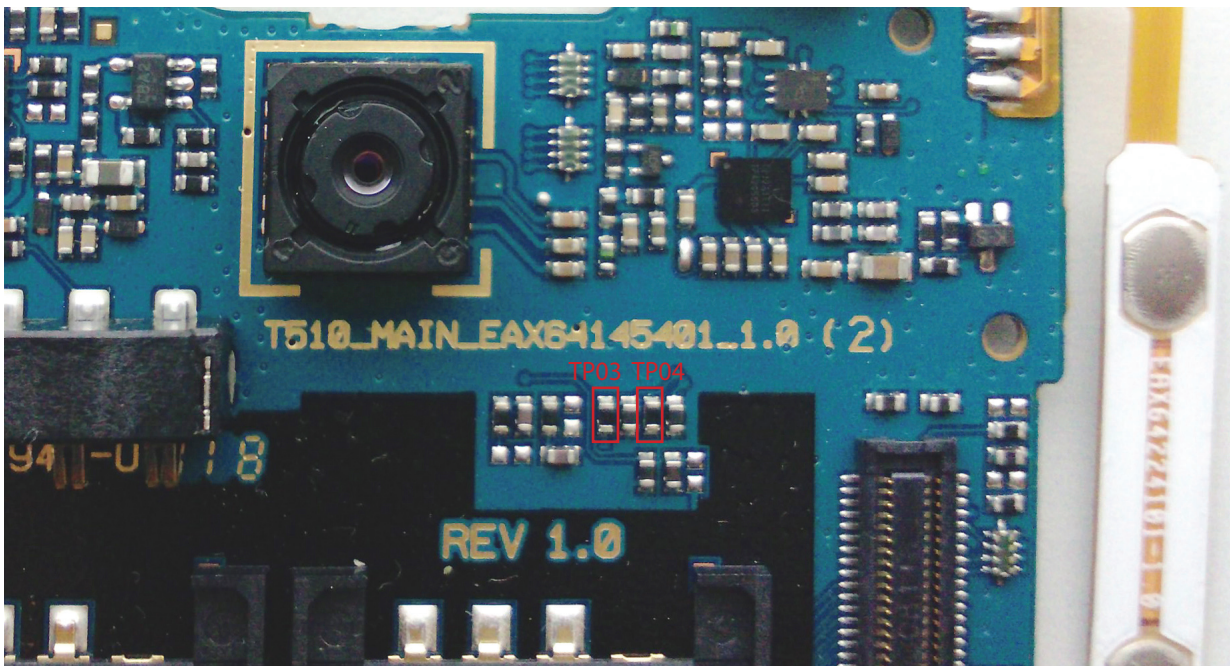
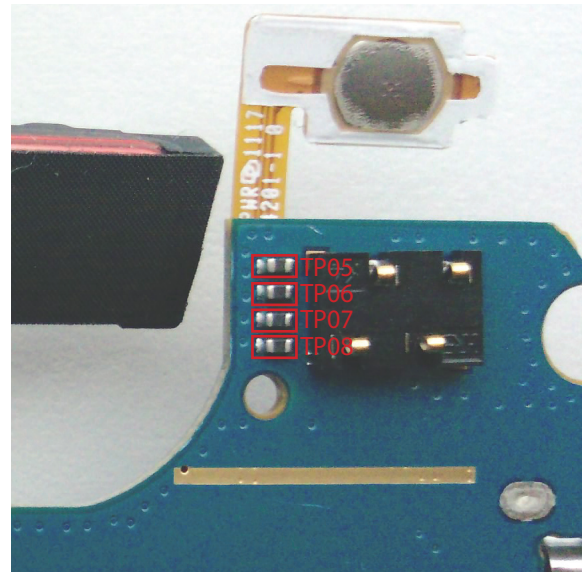
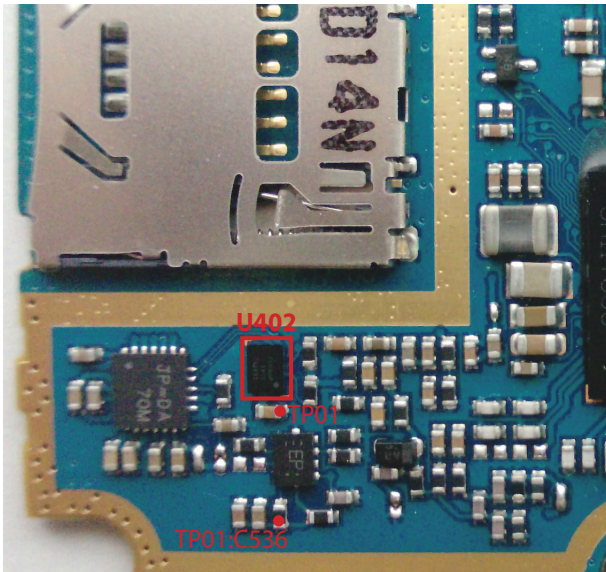


CHECKING FLOW



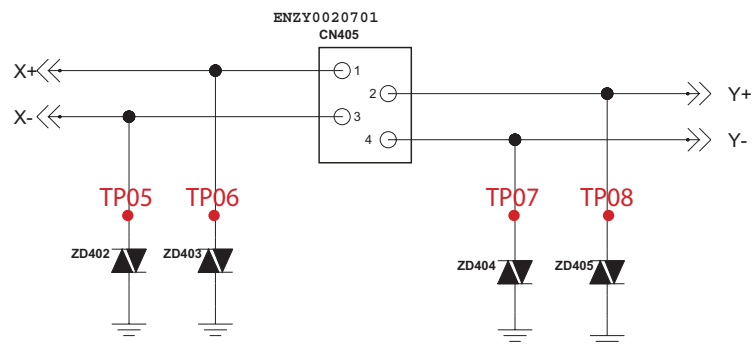
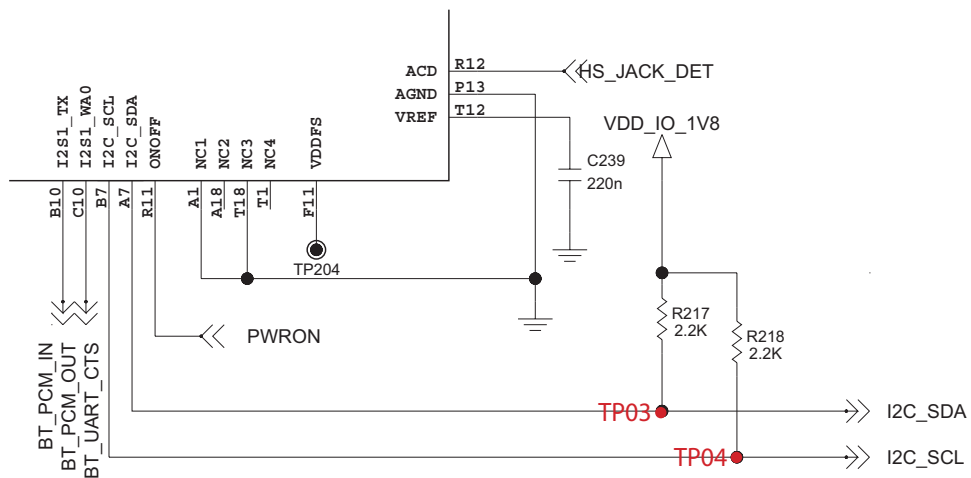
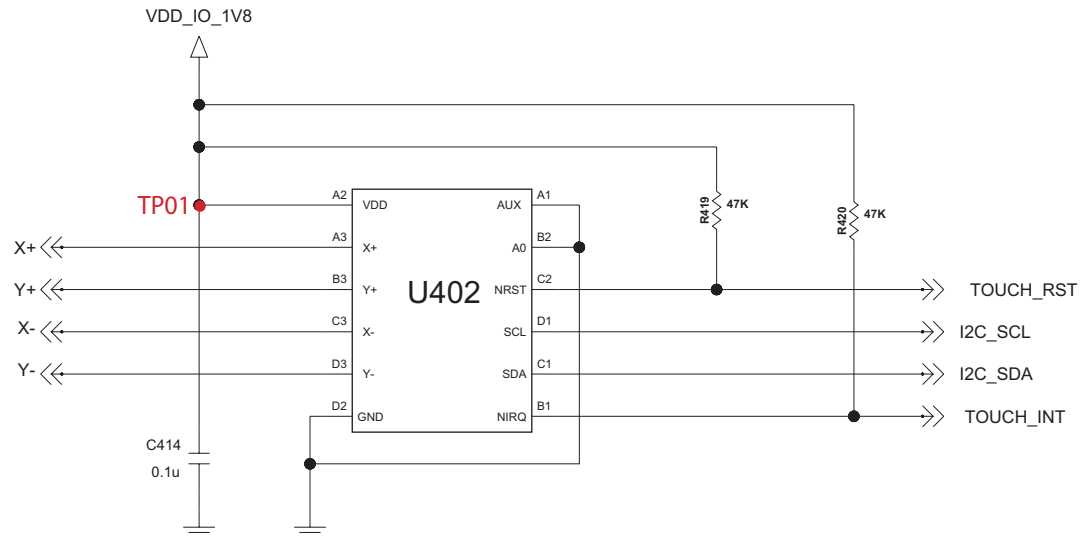
4.17 Touch Trouble

TEST POINT

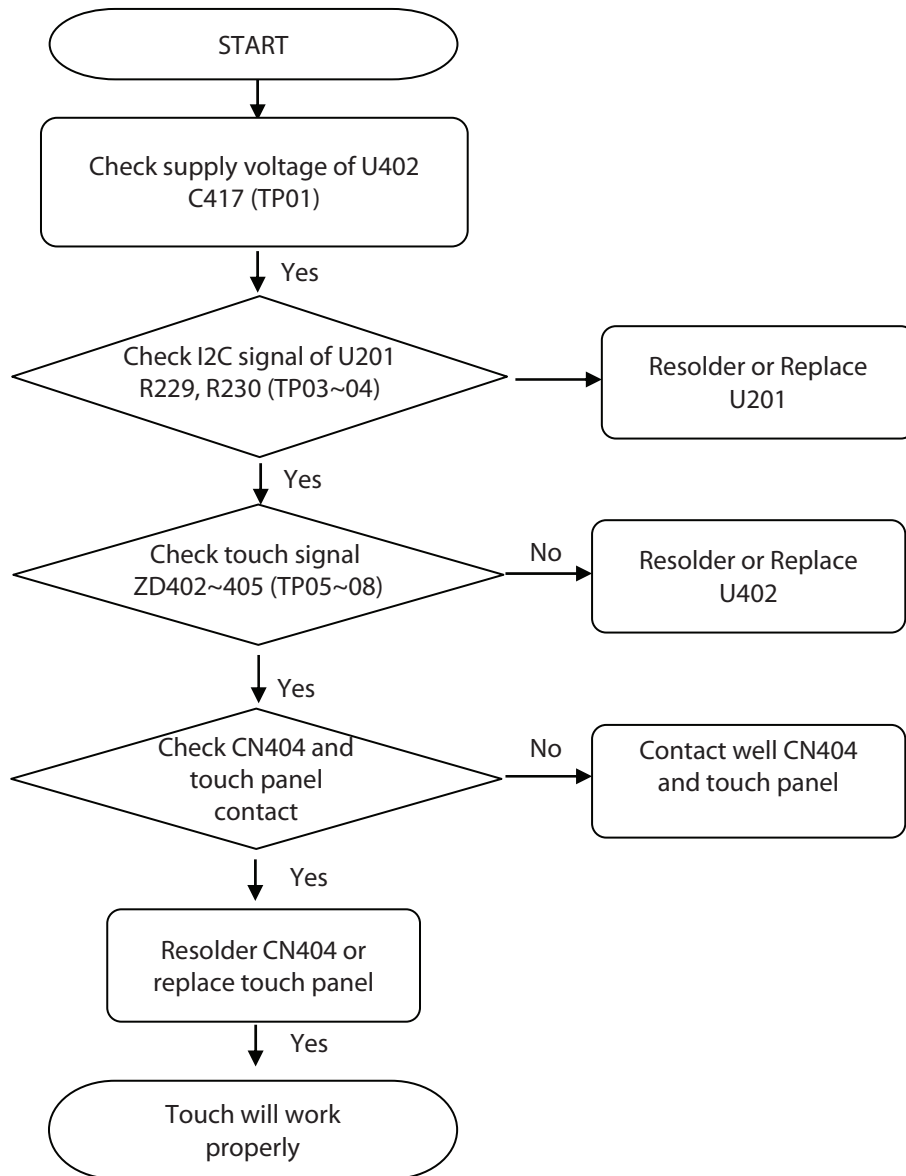


4. TROUBLE SHOOTING

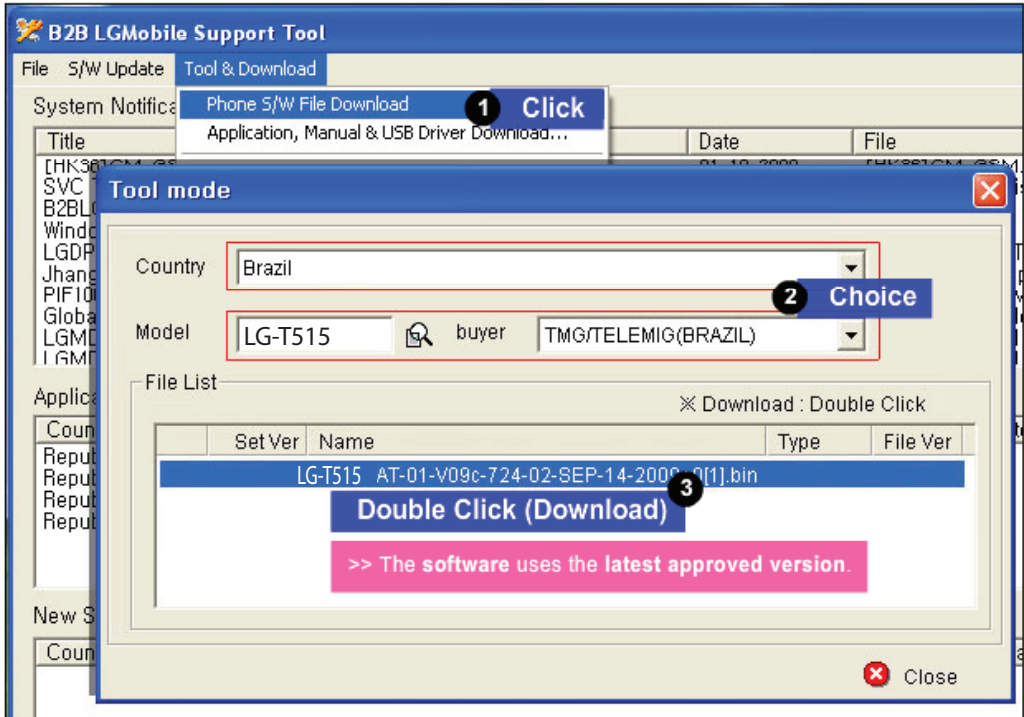
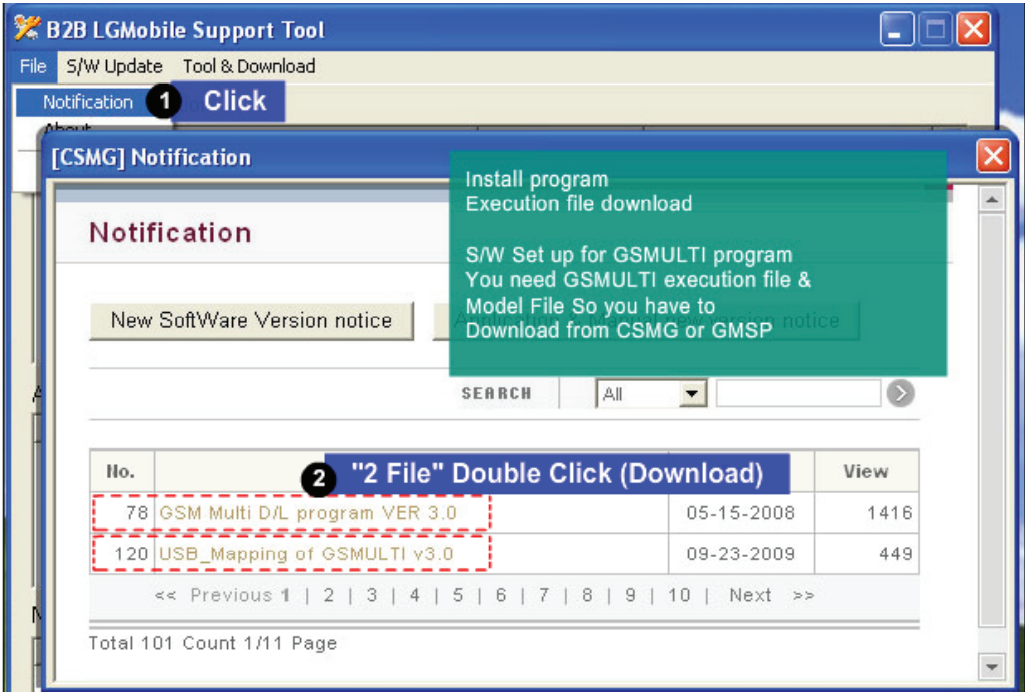
CIRCUIT



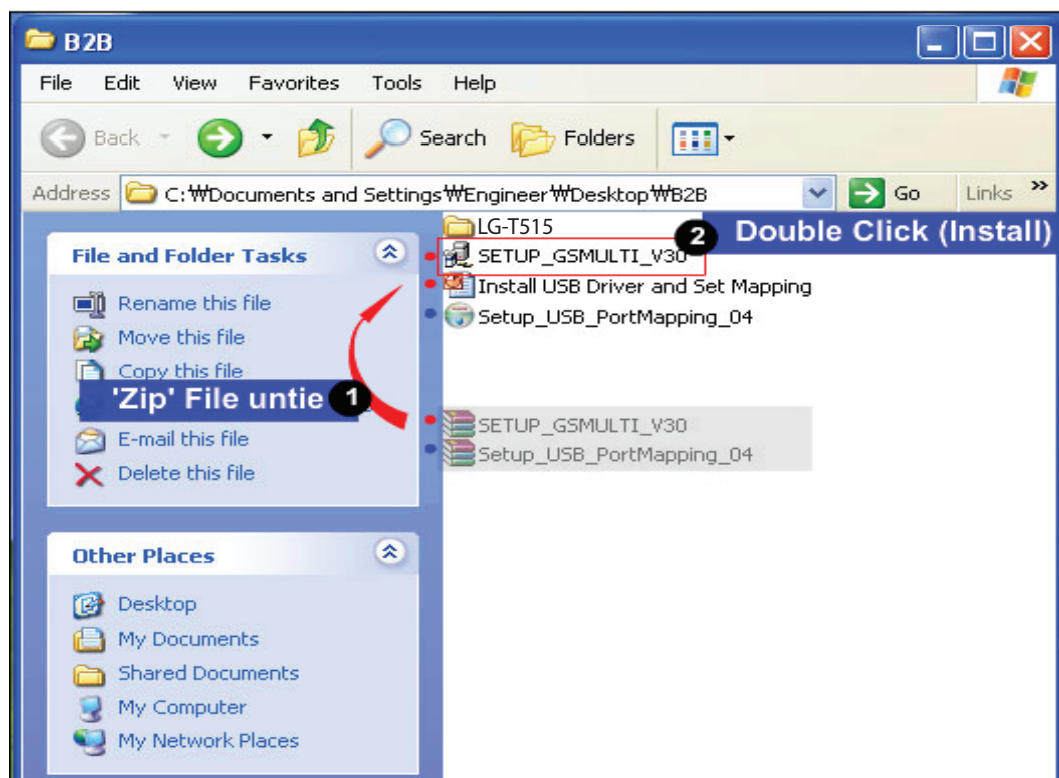
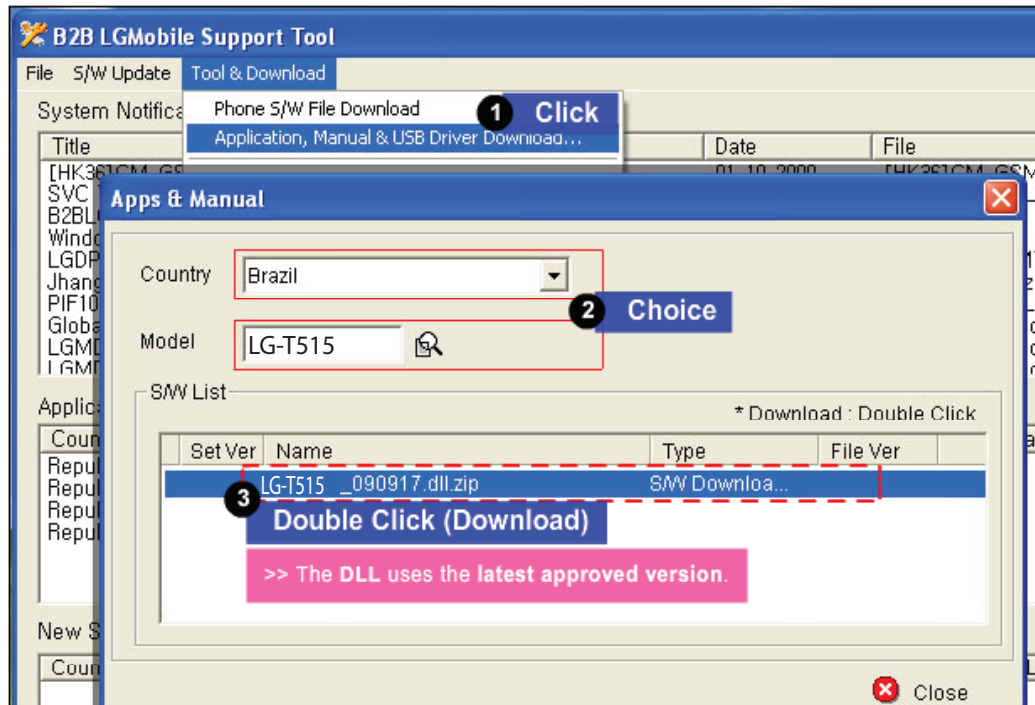
CHECKING FLOW



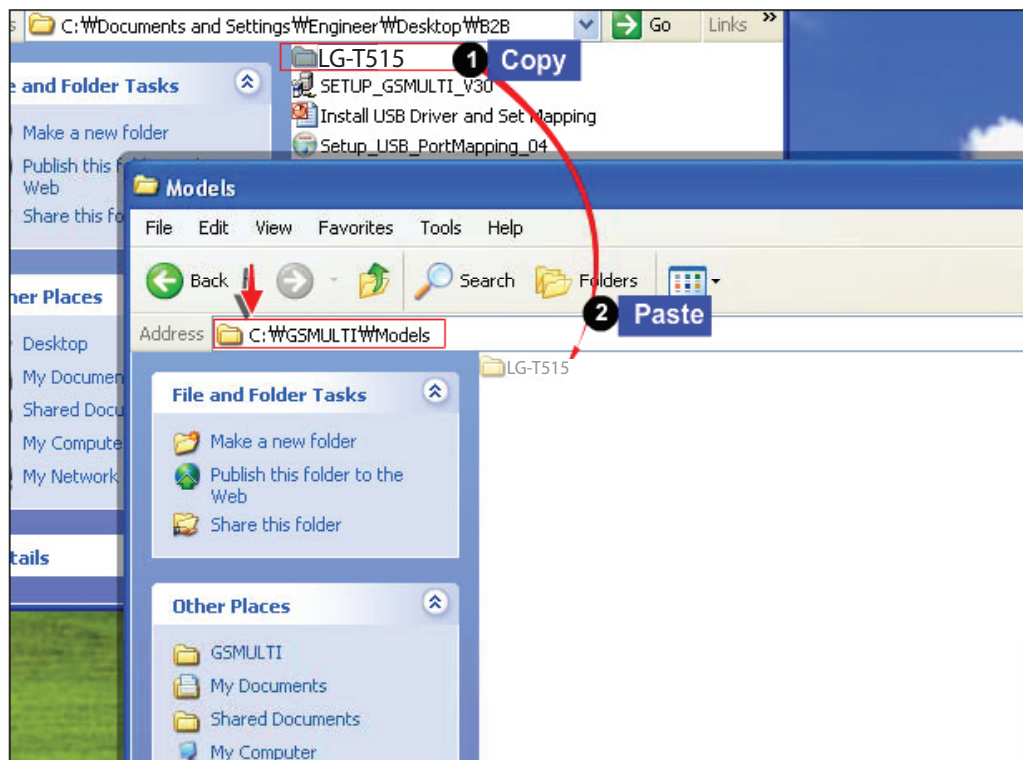
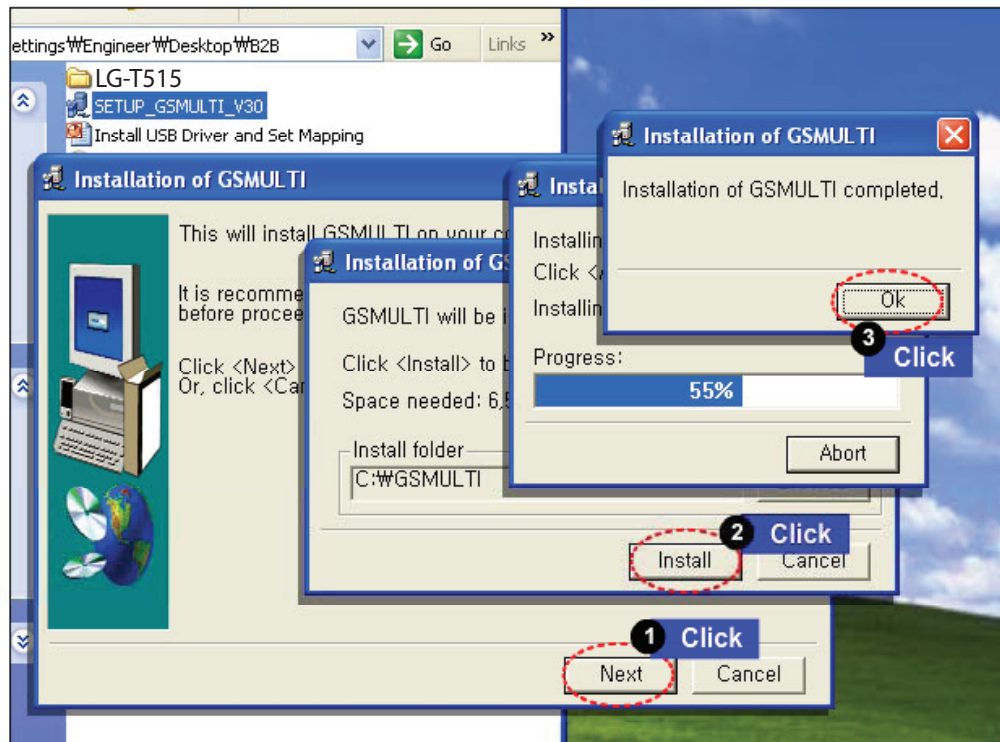
5. DOWNLOAD



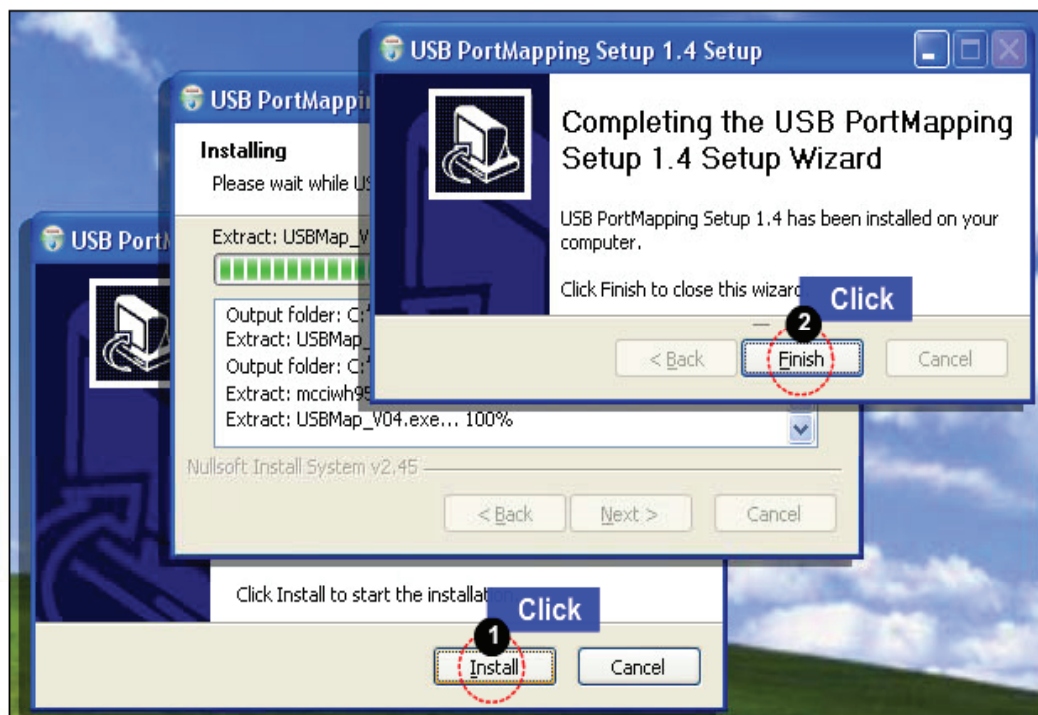
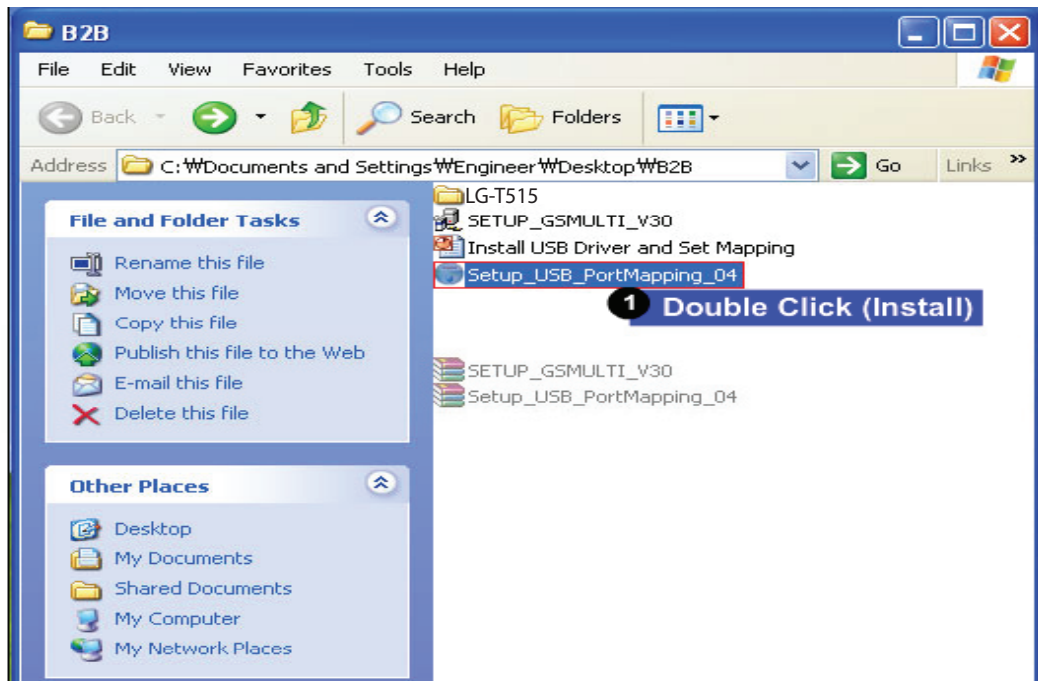
5. DOWNLOAD



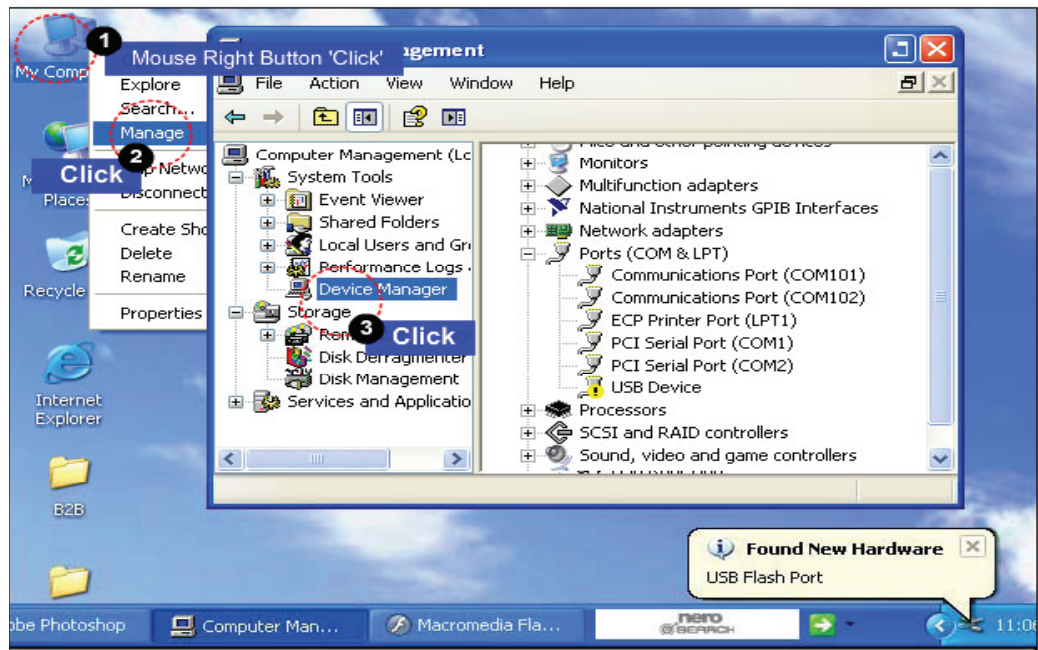
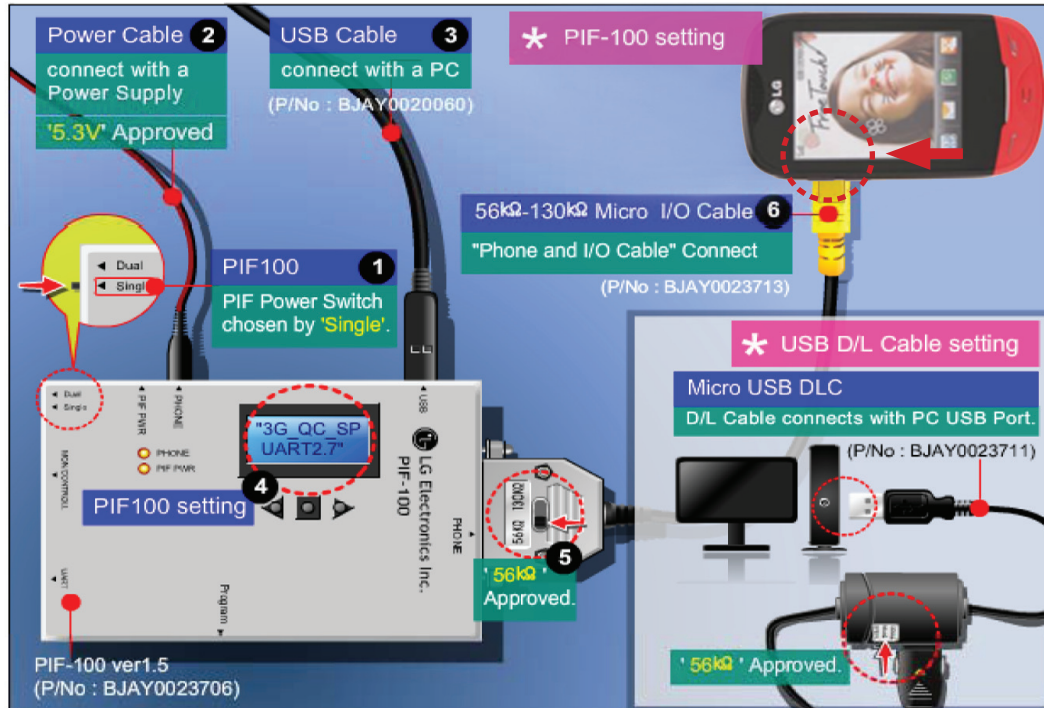
5. DOWNLOAD

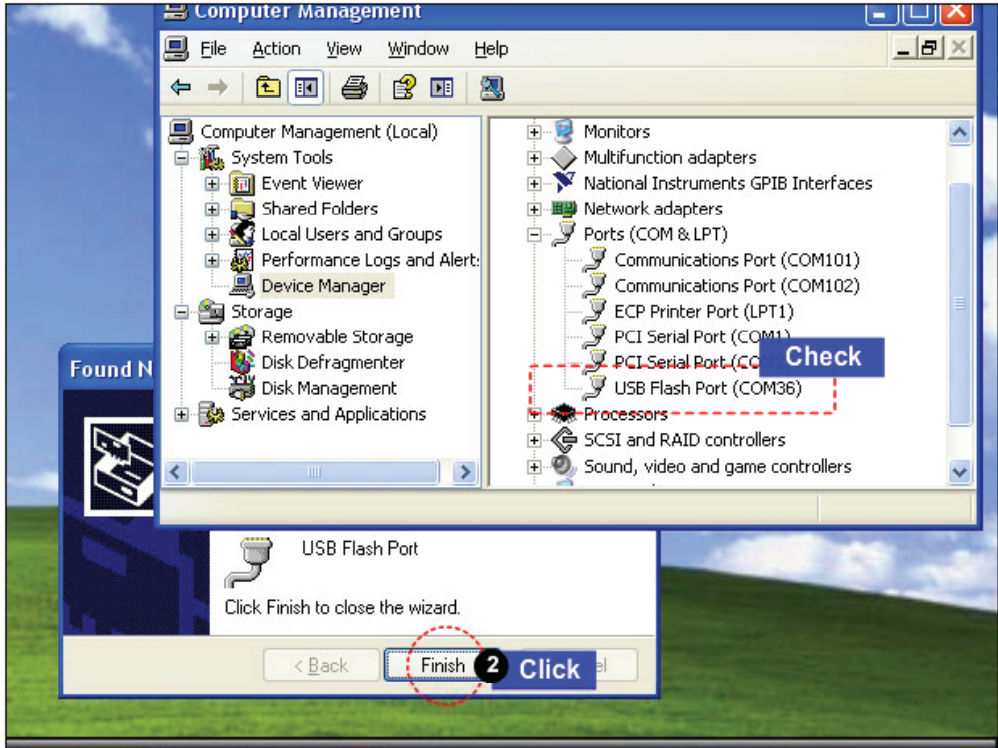
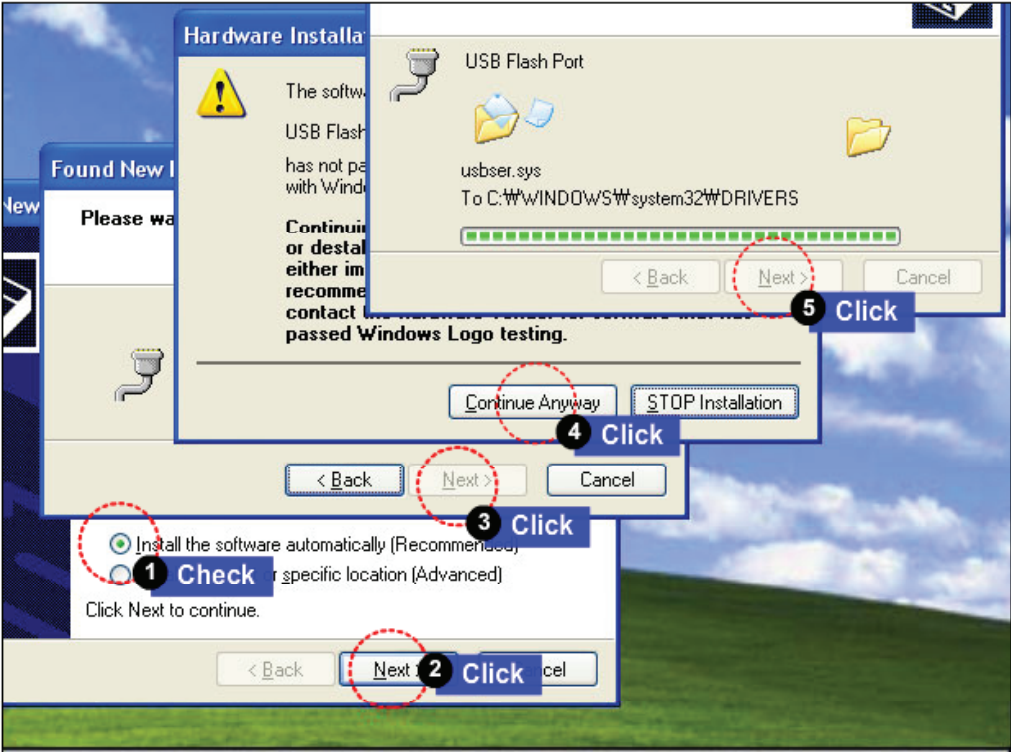


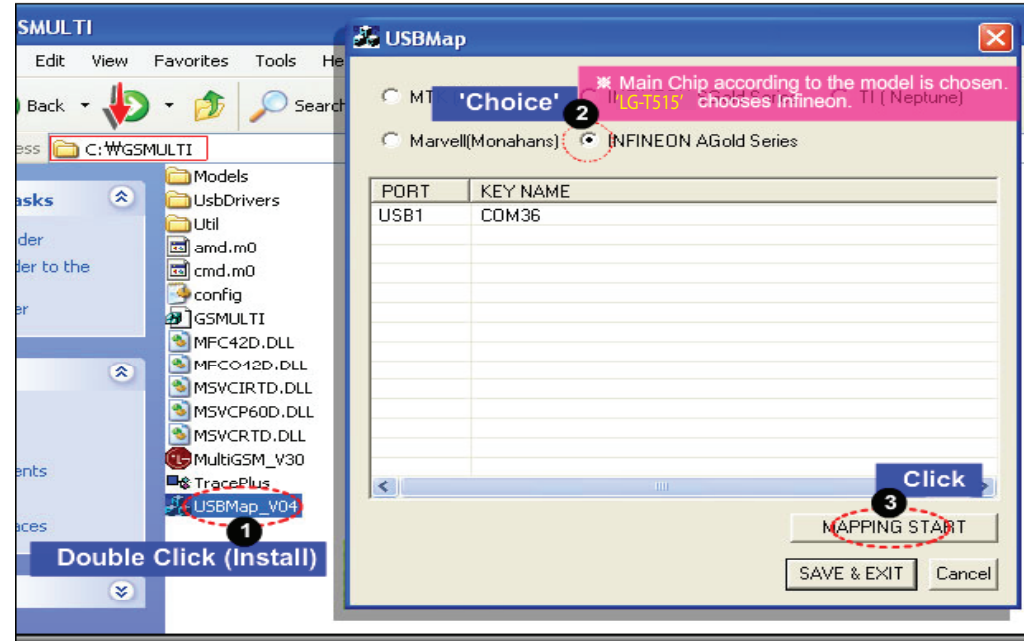
5. DOWNLOAD



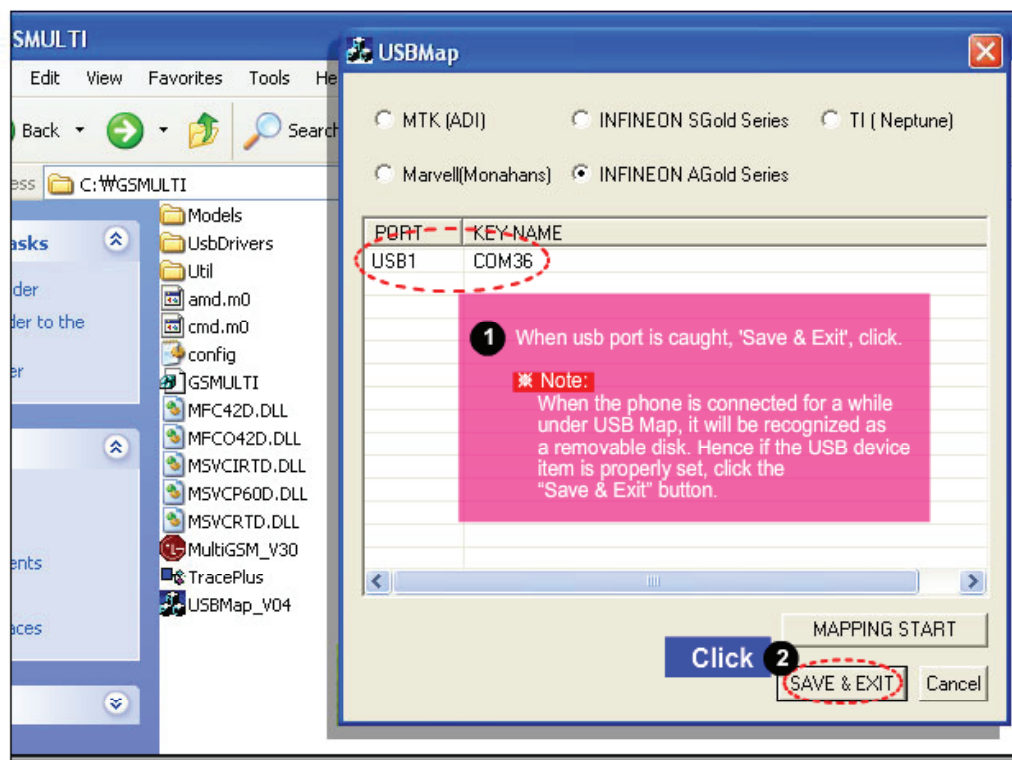
5. DOWNLOAD



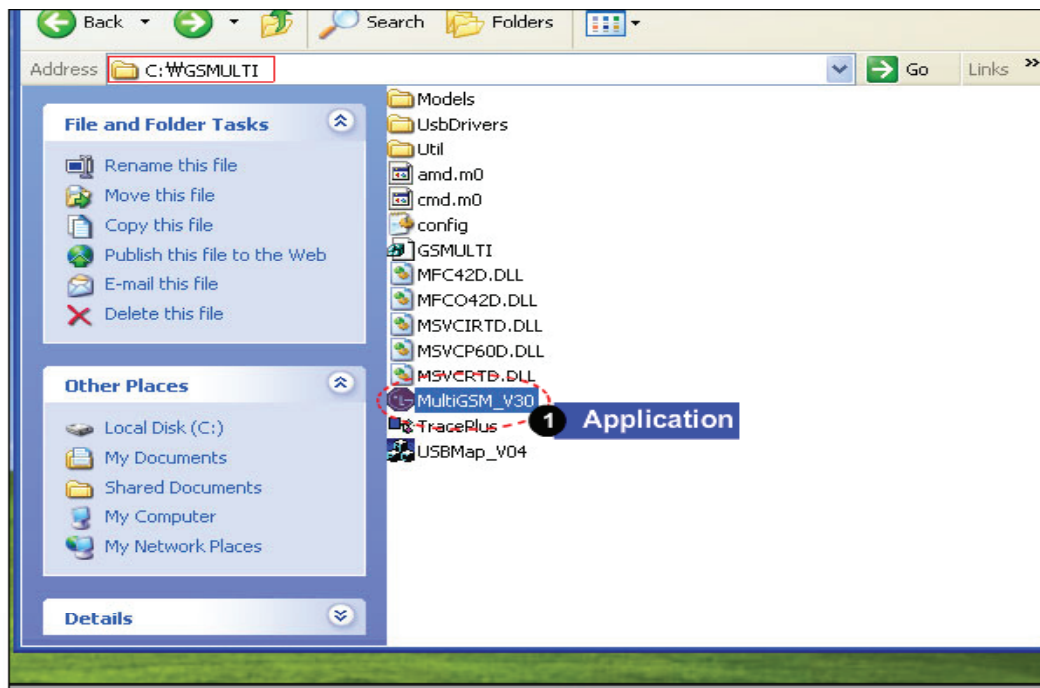
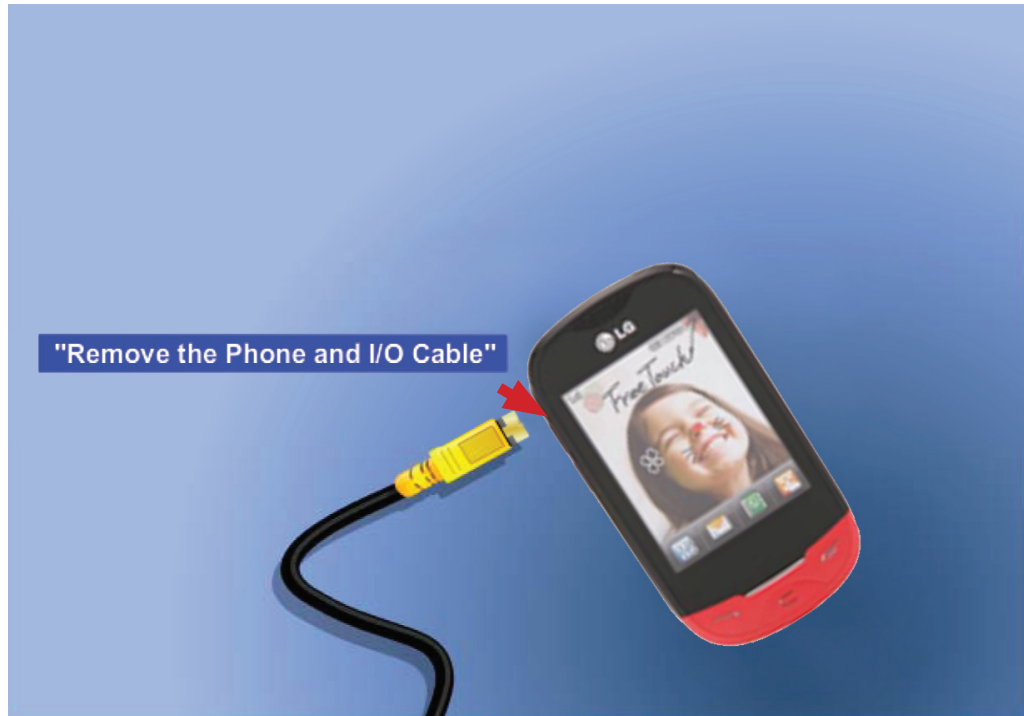


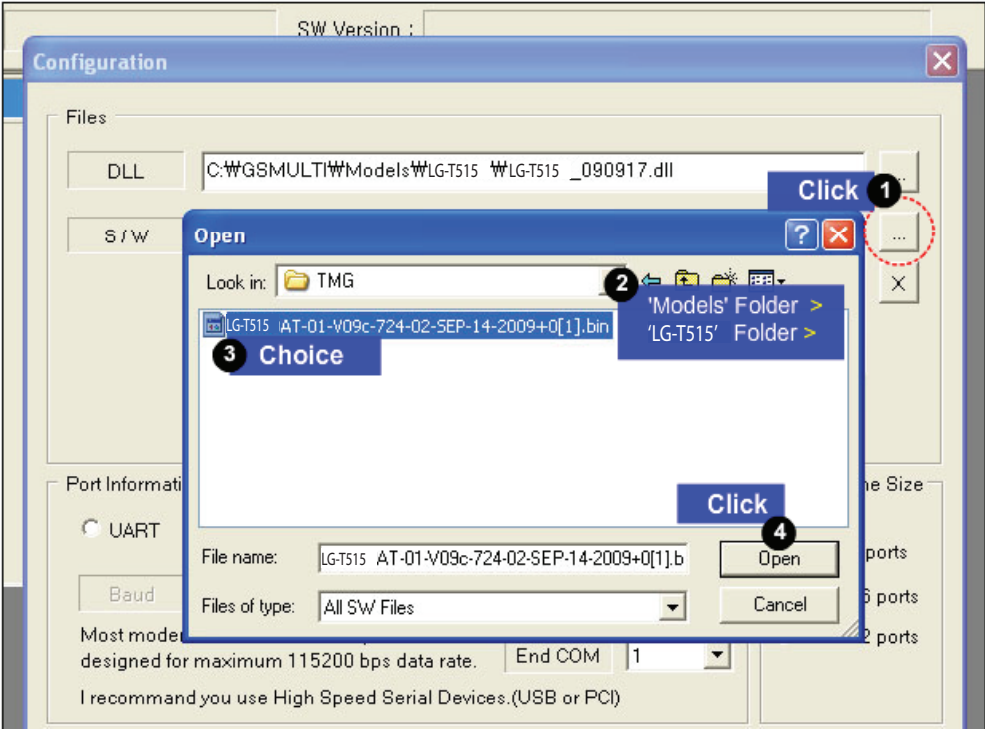
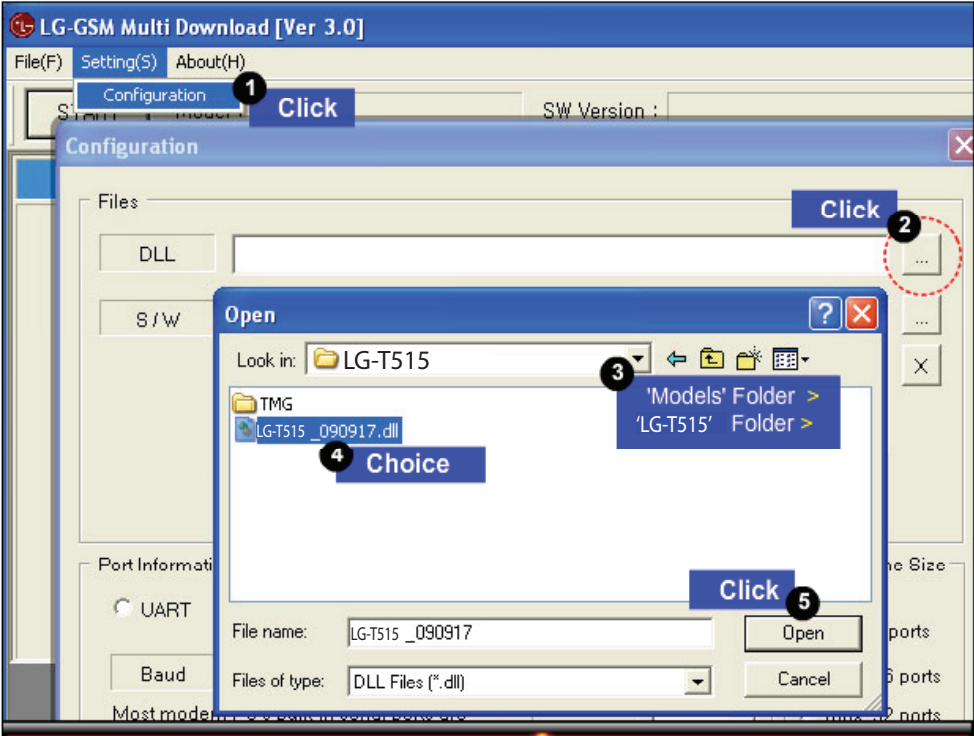


5. DOWNLOAD

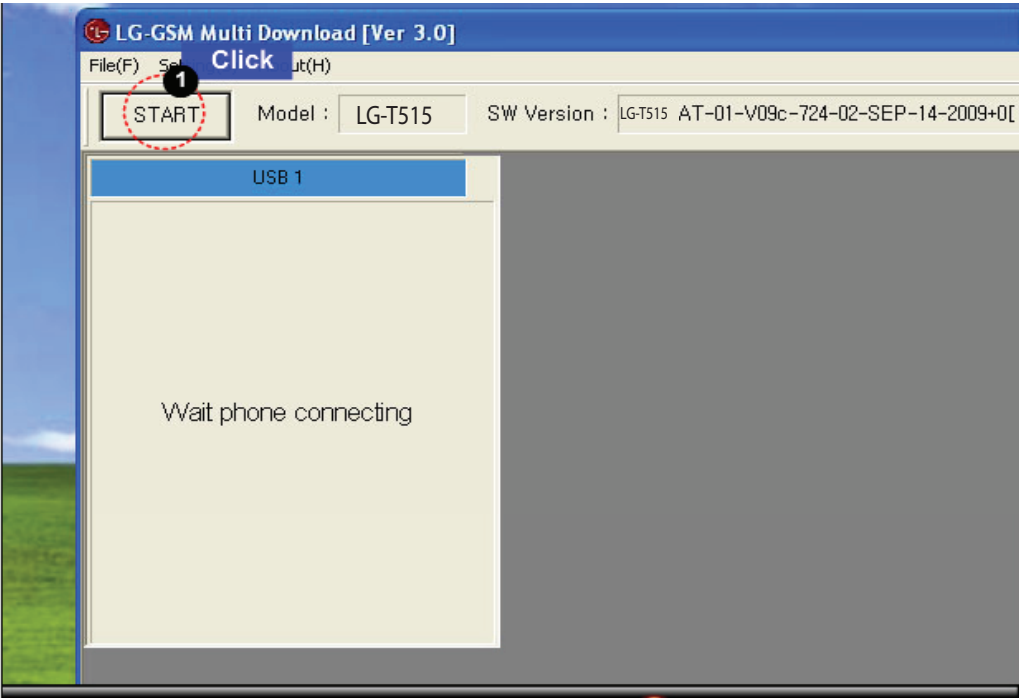
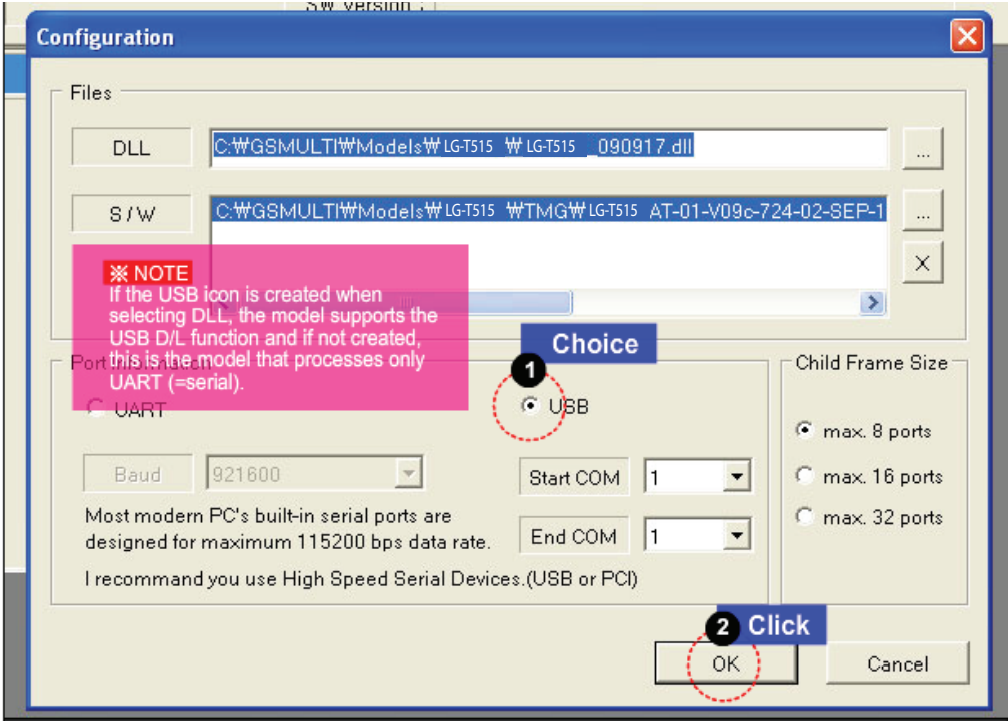


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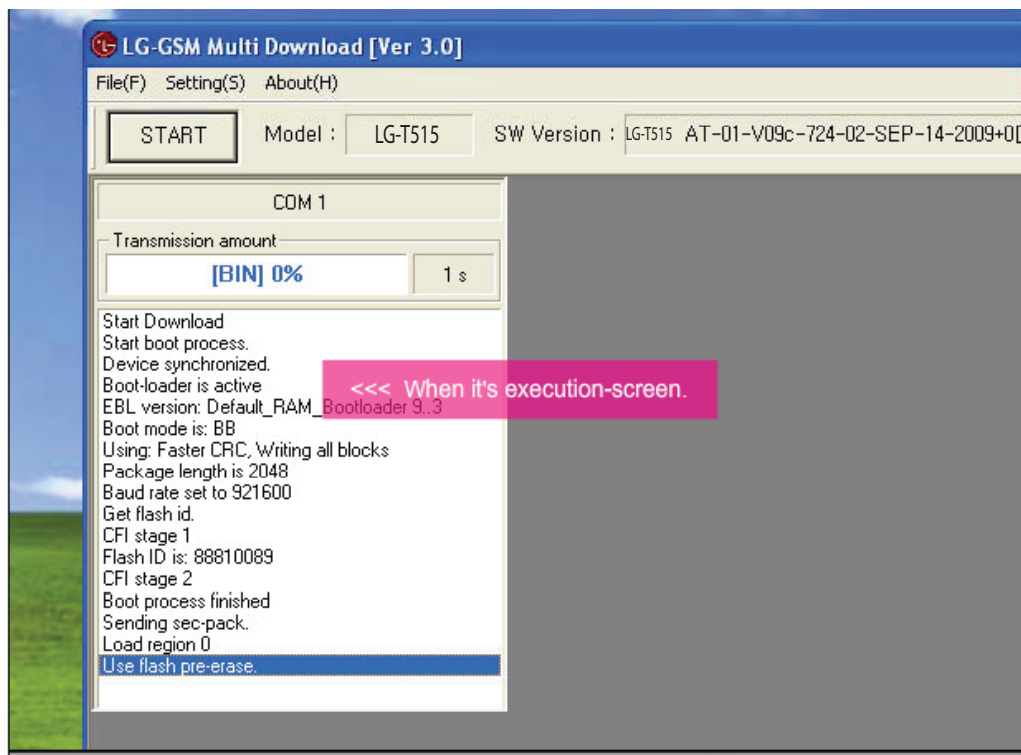




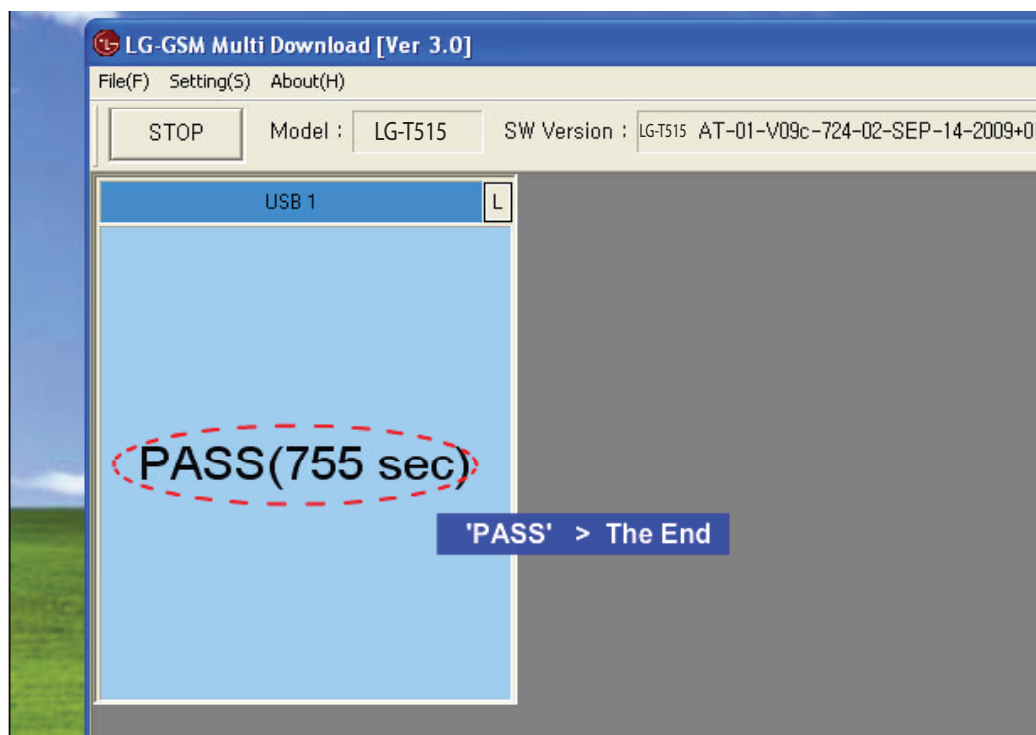
5. DOWNLOAD



5. DOWNLOAD

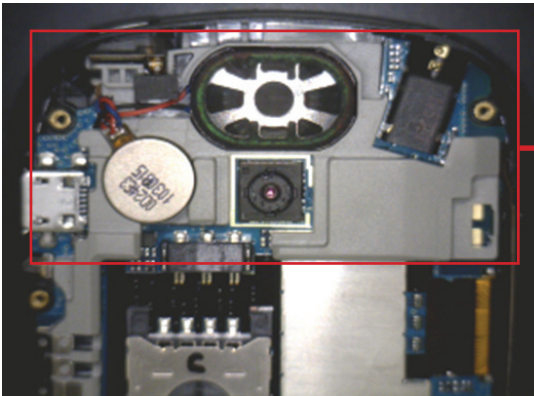


5. DOWNLOAD

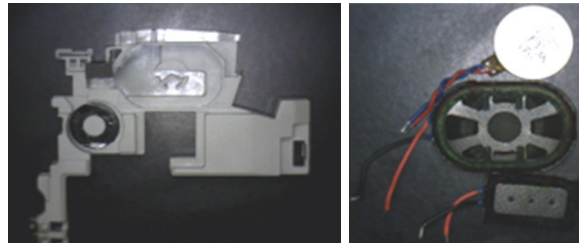


6. REPAIR GUIDE

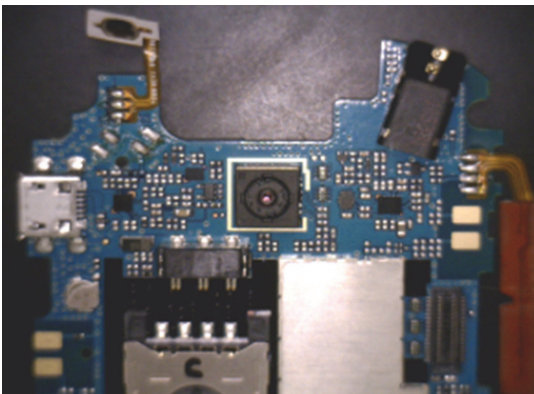
6.1 Disassemble Main Board



Main Board (with camera Module)



Disassemble Electric wire and some part that vulnerable to heat.

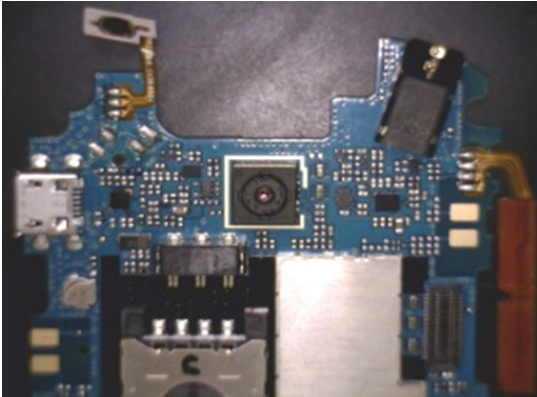


Main Board
(disassembled parts that vulnerable to heat)

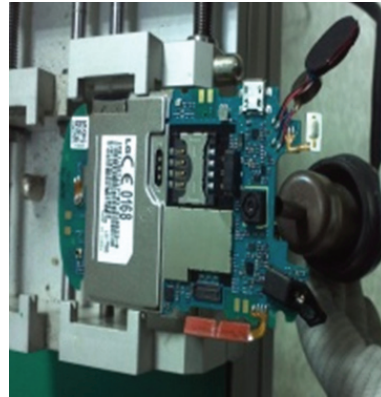
Description

1. Disassemble the main board from the Phone.
2. Disassemble parts that vulnerable to heat around the camera module.
ex) Electric wire, Dome Key and so on.

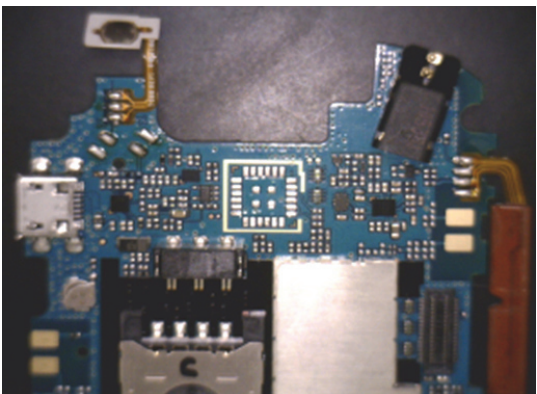
6.2 Disassembly Camera Module



Before disassembling the Camera module



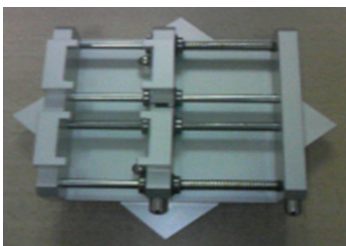
Disassemble the camera module Using Hot-Gun
(heat rear of the main Board)



Main board (disassembled the Camera module)

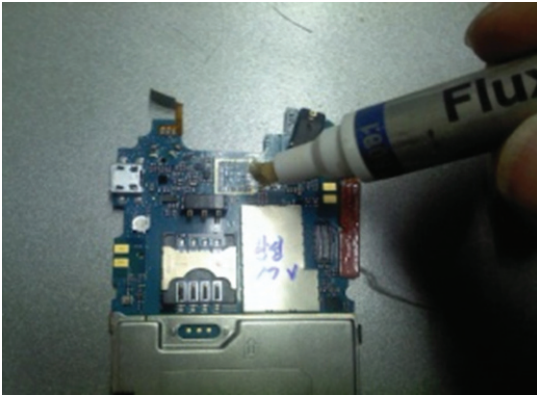
Description

1. Temperature of a Hot-Gun : About 330°C~340°C
2. Heat rear of the main Board
 - (1) Distance between Hot-Gun and PCB : About 3cm
 - (2) heating time : About 13 sec

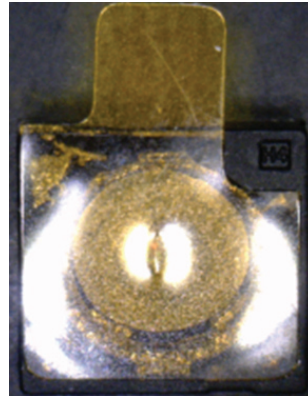


BJAY0007201

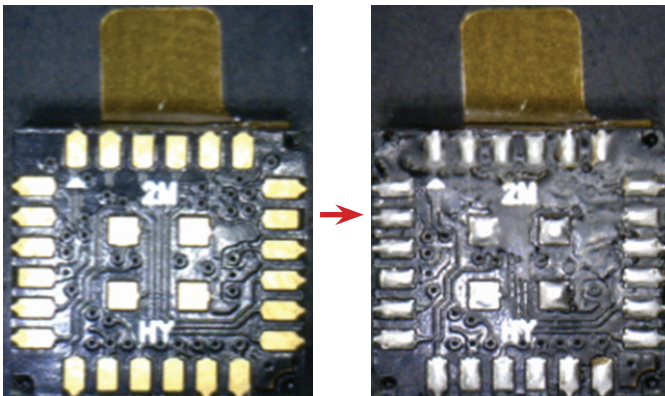
6.3 Ready to Rework Camera



Spread Flux to pad on the board



Ready to rework Camera

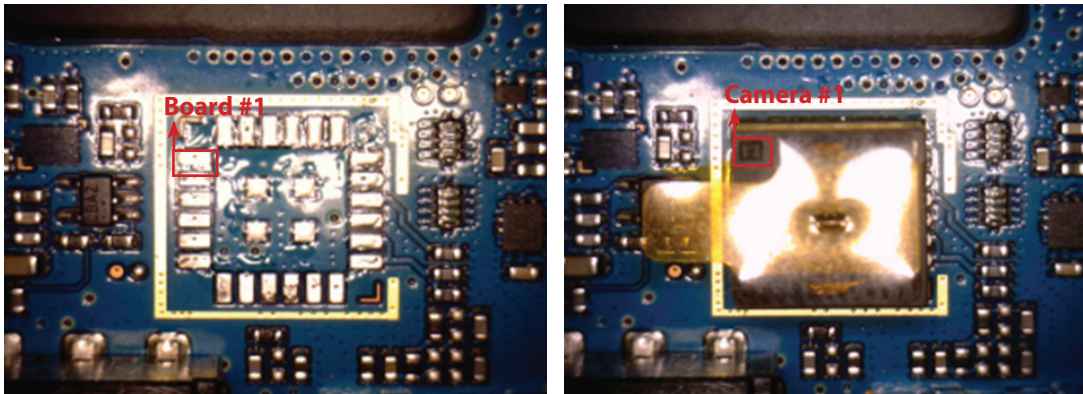


Rework Camera (Bottom Pad Soldering)

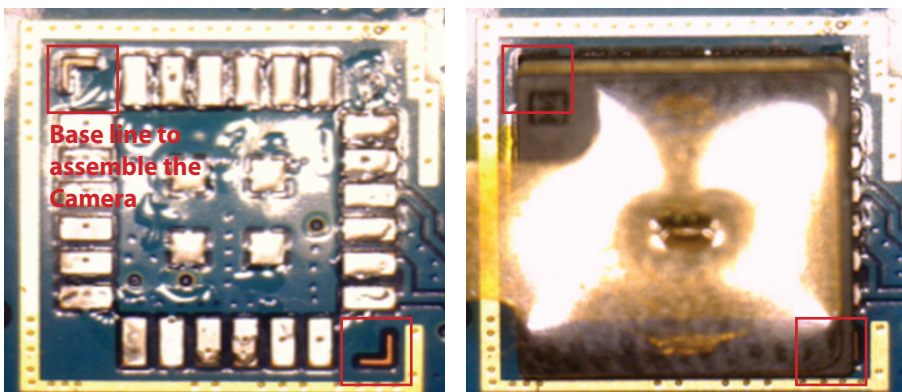
Description

1. Spread flux to space that removed camera module on the main board.
2. Ready to rework Camera module.
3. Rework Camera Bottom Pad Soldering.

6.4 Assembly Camera (Rework)



Match Board Pin Map and Camera Pin Map

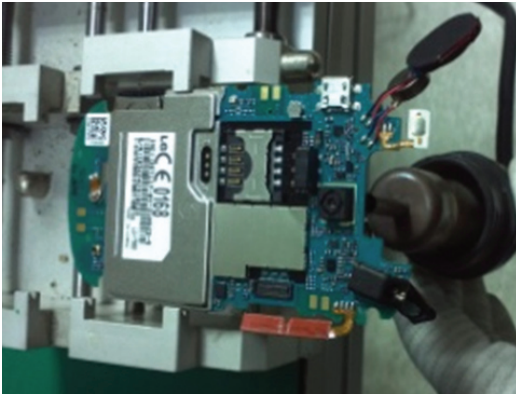


There are two base line like "L" on the edge of the camera area

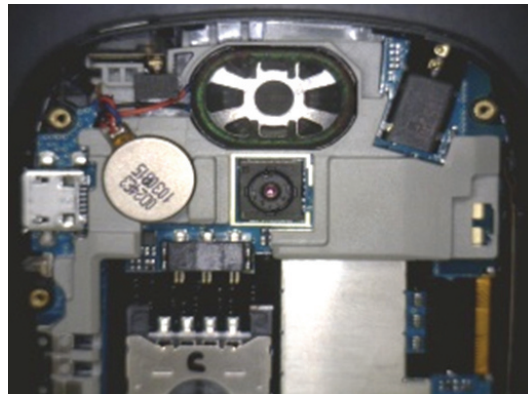
Description

1. Check the site to assemble Camera.
 - (1) Match Pad #1 and Camera #1 on the board.
2. Assemble the camera module matching base line on the board.

6.5 Soldering Camera Module and Function Test



Soldering the camera module using Hot-Gun
(heat rear of the main Board)



Assemble another parts that is disassembled
before

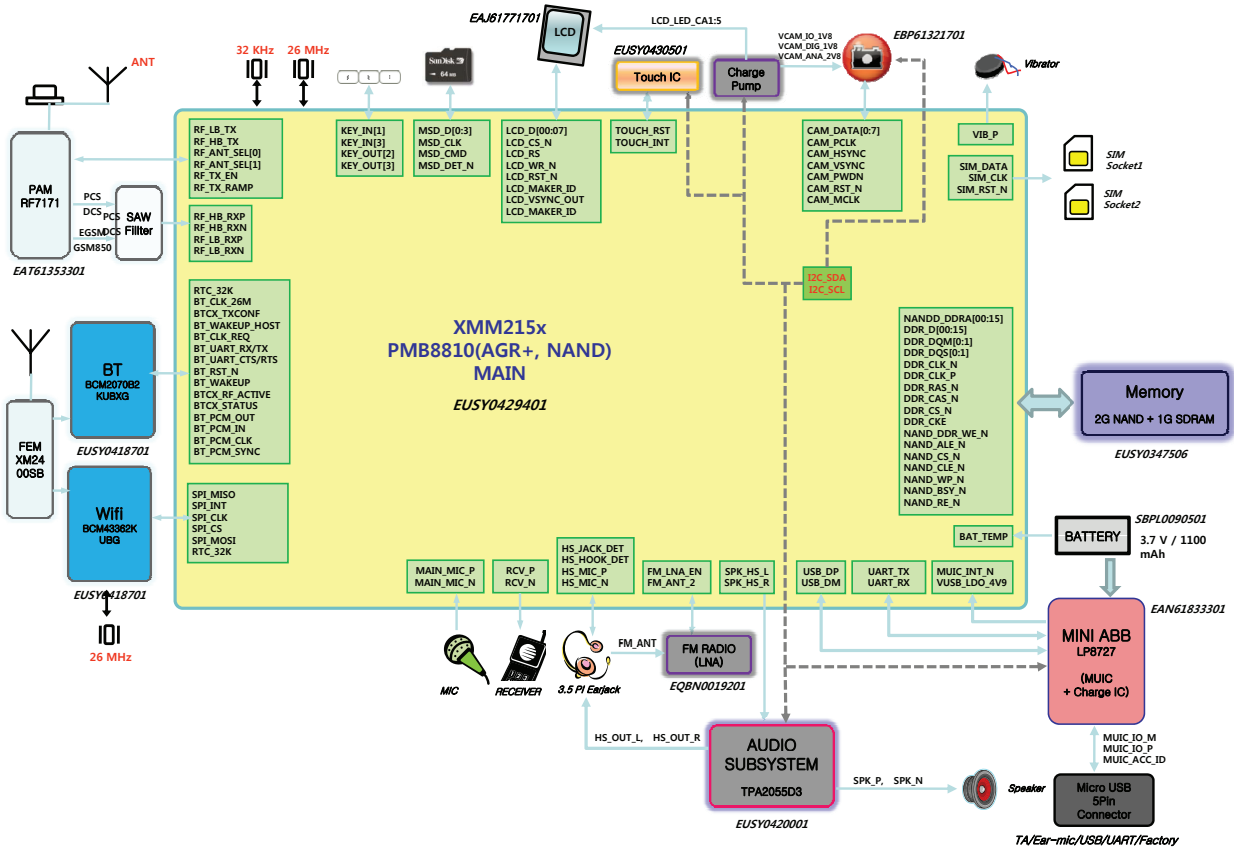


Function Test

Description

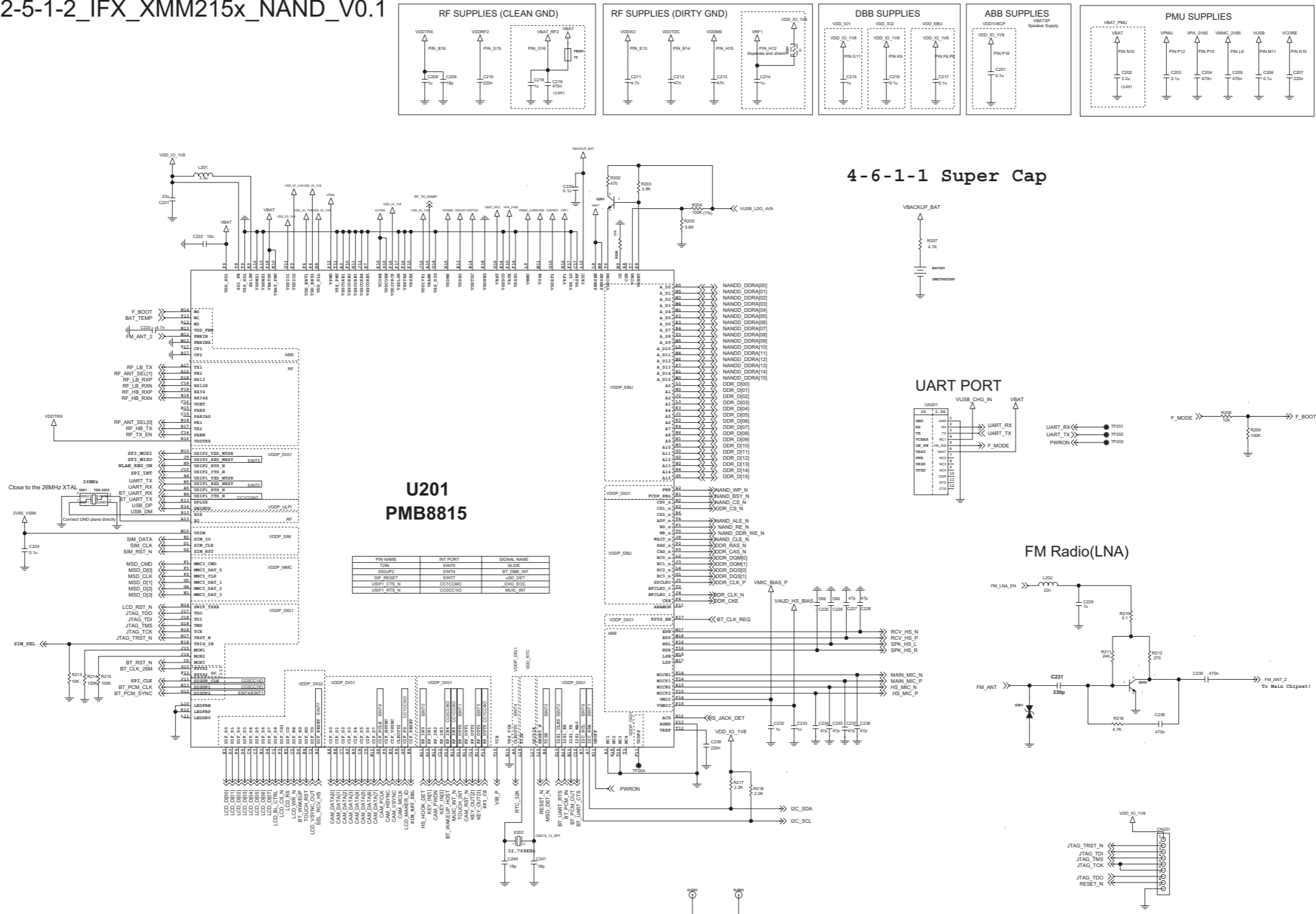
1. heat rear if the main Board
 - (1) Distance between Hot-Gun and PCB : About 3cm
 - (2) Heating time : About 13 sec
2. Remove the protection tape on the Camera Lens
3. Assemble another parts that disassembled before
4. Function Test

7. BLOCK DIAGRAM



$$\pm \frac{1}{2} \text{ } \mu_B \text{ } \text{FIX}$$

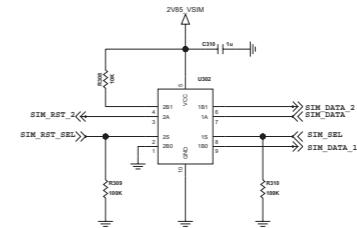
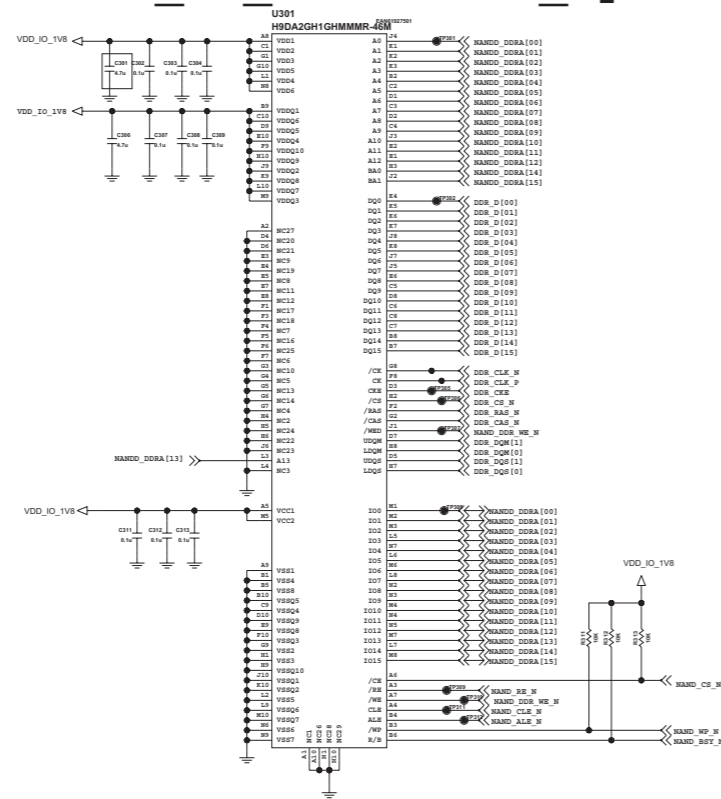
2-5-1-2_IFX_XMM215x_NAND_V0.1



Micro_SD

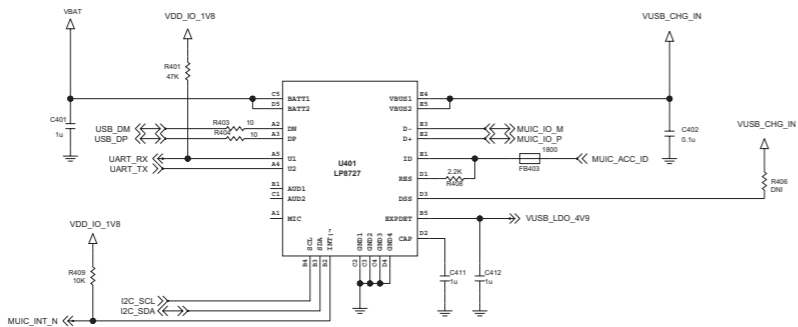


These are added for CMCC ESD test

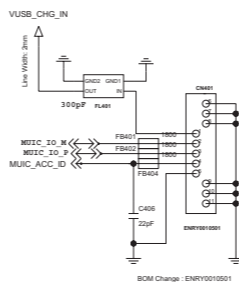
[illegible]

ZD200ZD201 is DNI defaultly

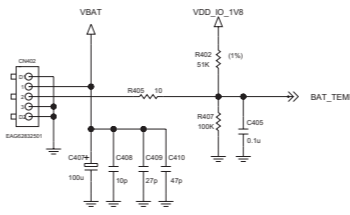
MINI ABB (MUIC + CHARGE ID)



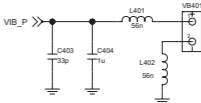
4-2-3-1 Micro-USB 5pin normal



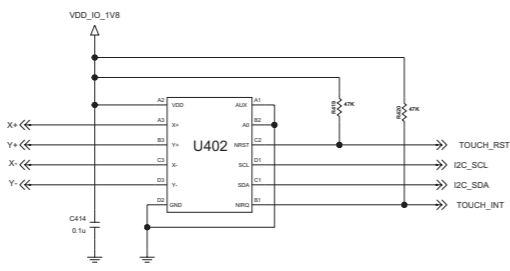
4-5-1-1 Battery Connector



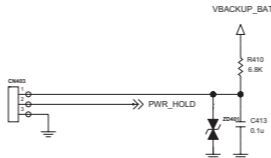
MOTOR



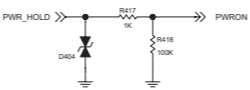
TOUCH IC



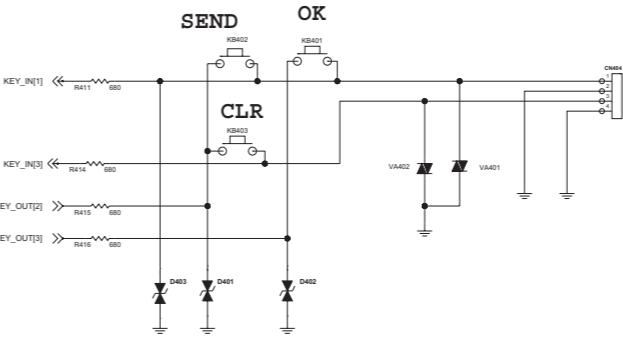
POWER ON



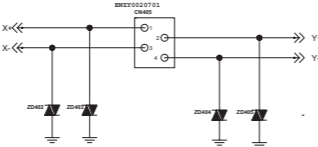
PWR/HOLD



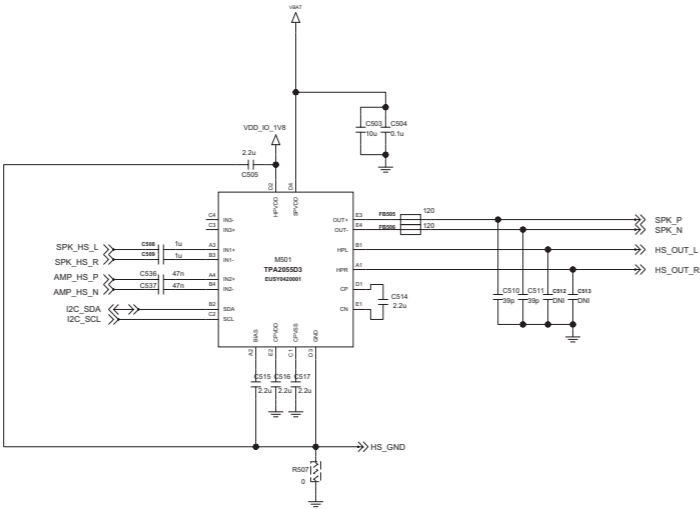
KEYPAD INTERFACE



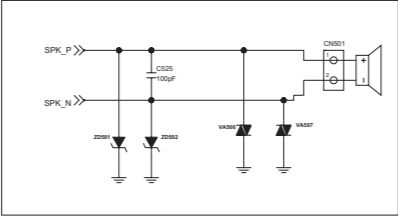
TOUCH CONNECTOR



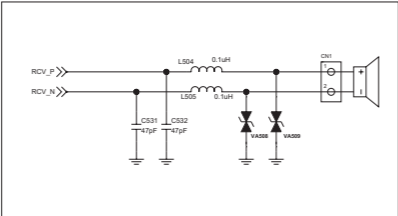
AUDIO SUBSYSTEM



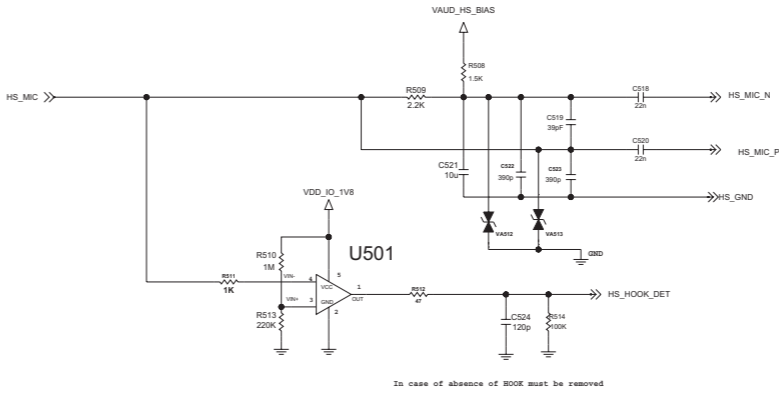
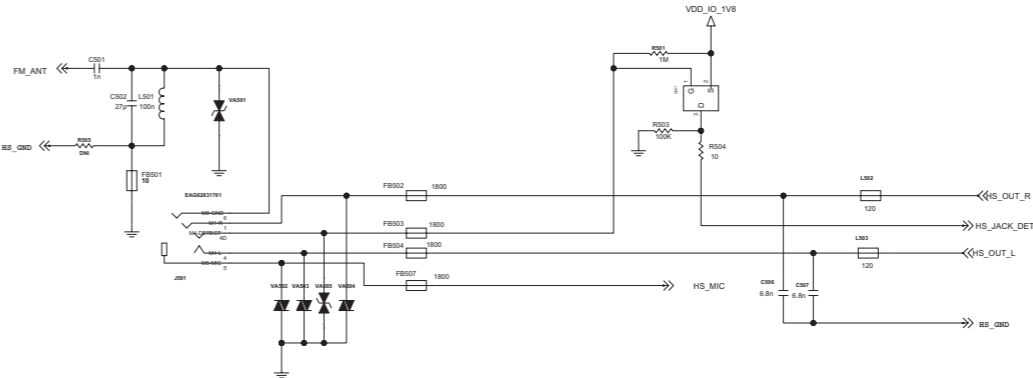
SPEAKER



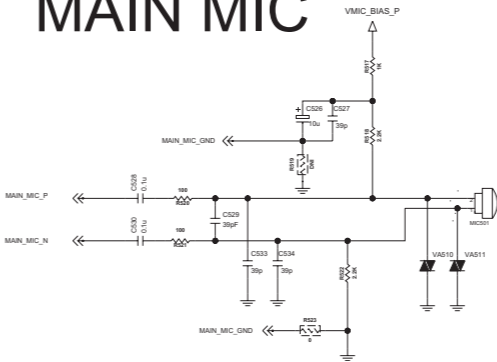
MAIN RECEIVER



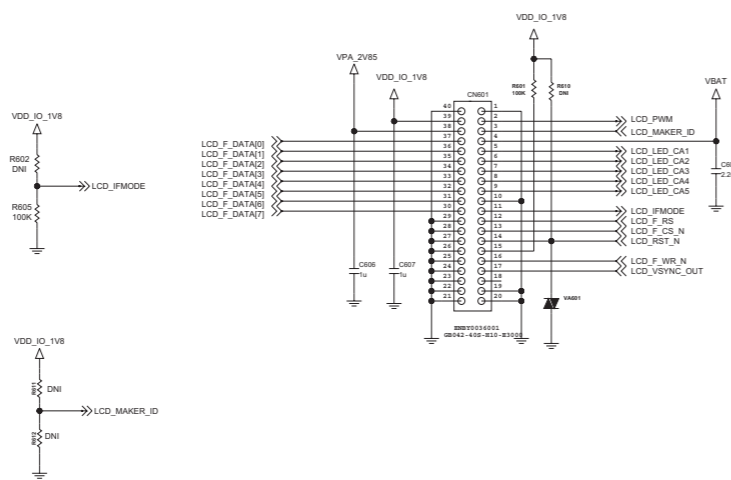
3.5pi HEADSET



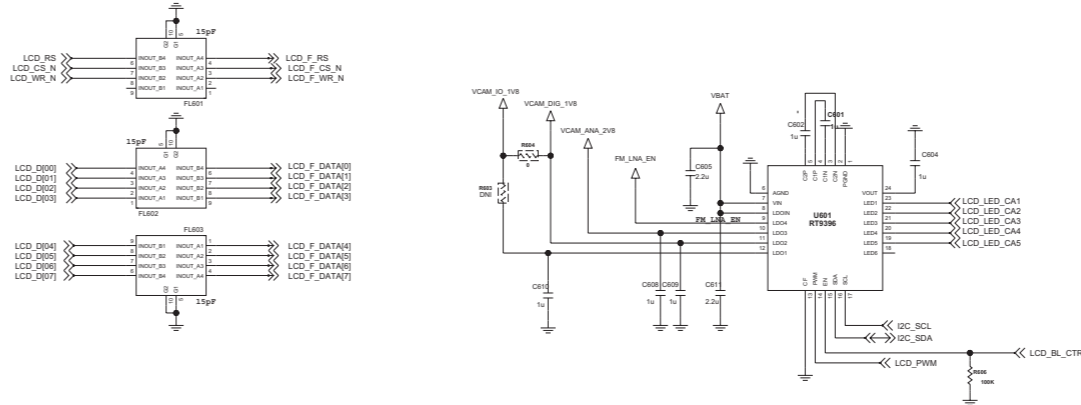
MAIN MIC



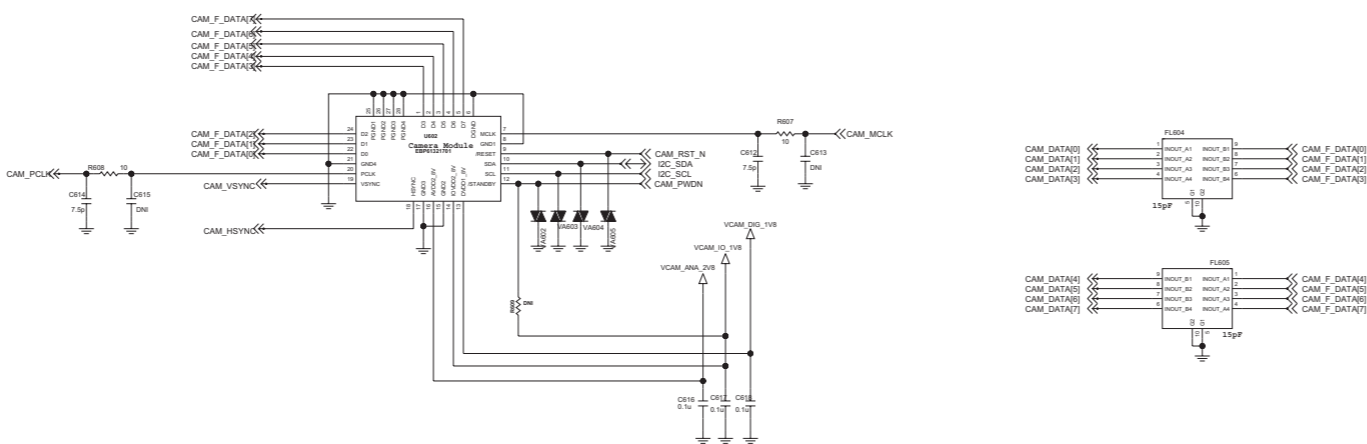
LCD CONNECTOR



6ch_CHARGING PUMP _4LDO



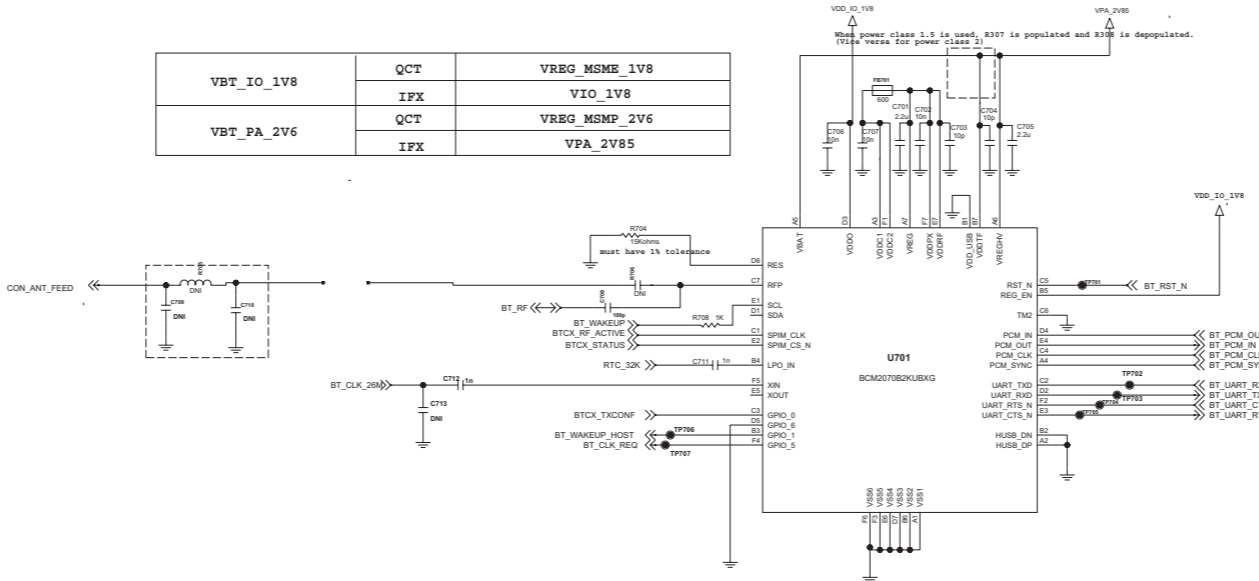
Camera Module (2M reflow)



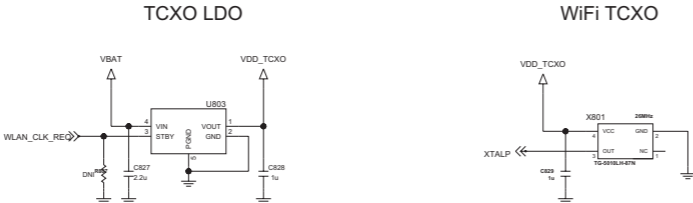
BT

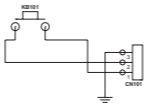
7-1-1-3_BCM2070(QCT & IFX Only)_0.4Pitch

Class 2 or 1.

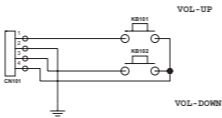


WIFI





F_SK_VOL




9. BGA PIN MAP

BGA IC pin check (U201)

- Ball Diagram (Top View), PMB8815(A-GOLDRADIO+)

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T		
18		FE1	R132	R133	R134	R134	TM5	TKK	TDI	TRIG_N	F32K	EPN		VBATSP	VDDNEG		18	
17	TX1	TX2	VSSRF			VSSRF		TRST_N	TDO	FSYS_EN	OSC32K	EPN		VSSLR	CP2		17	
16	FE2	VDDTRN				VSSRF	VBAT					VSSR5		VDDM5CP	HSL	HSR	16	
15	VRAMP					VSSRF	VDDRF2	VDDM5	MON1		RESET_N			VUMIC	MICN2	MICP2	15	
14		VDDTDC	PAEN			VSSRF_D	VSSRF_D	VSSRF_D	SWIF_TXRX	MON2	DMRUS			M0	VMIC	MICN1	MICP1	14
13	V0	V0L				VDDV0	FSYS2	FSYS1	DIGUP1	DIGUP_CLK	DPLUS	VSS1A	PUSSP	VSS_FUA	AGND		M1	13
12	KP_IN1	KP_IN2	KP_IN3	KP_IN4	KP_IN5	KP_OUT5	DIGUP2	VR1	VDDV81	LEDSP	VRTC			VPMU	ACD	VREF	12	
11	KP_IN0	KP_OUT1	KP_OUT2	KP_OUT0	KP_OUT3	VDDP5	VDD01	VSSCORE	VSSCORE				VUSB			ONOFF	VSS_PMU	11
10	QS1_RX	QS1_TX	QS1_WA0	QS1_CLA0	CF_D7	VSSCORE	VDDCORE	USP1_T1D_M_TSR	USP2_CTS_N	VDDCORE	UDFBN	VSM	VBAT_PMU	VAUX	VSS_VB	VIB	10	
9	CF_D3	CF_D4	CF_D6		CF_VSYN0	CF_HSYN0	CF_PD	USP2_RTS_N	USP3_RVLS_M_RST	VDD02	VMMC	CS		VDD0D1	SDSW	VSS0D1	9	
8	CF_D0	CF_D1	CF_D5		CF_RESET	CLKOUT2	CF_PCLK	VDD_DLL	WAIT_N	VSWT	SENSEH	SENSEP				SDLFB	8	
7	QC_SDA	QC_SCL	CF_D2											A_D3	VSSCORE	VCHG	7	
6	CLKOUT0	T2IN	MON3	DIF_RD		VDD_EBU	A5	A6					A_D12	VDD_EBU		VDDCHG	6	
5	USP1_RTS_N	USP1_T1D_M_RST	DIF_WR	DIF_D3	DIF_CD	DIF_CS1	MMC_DAT1		SDCLK0			A_D0	A_D9	A_D1	CAS_N	A_D0	WR_N	5
4	USP1_T1D_M_TSR	USP1_CTS_N	DIF_D4	DIF_D7	DIF_H0	DIF_D2	MMC_DAT2	A4	BCLK0_1	A7	BC2_N	A_D3	A_D11	CKE	A_D7	ADV_N	4	
3	VSSCORE	DIF_D6	DIF_D5	DIF_D1	DIF_D0	MMC_DAT3	A11	A10	BCLK0	A4	A3	A_D5	A_D2	A_D5	A_D6	A_D8	3	
2	KP_OUT4	DIF_RESET	DIF_VD	CC_RST	CC_V0	MMC_CMD	A2	A3	A2	A6	BC0_N	A1	CS0_N	RAS_N	CS1_N		2	
1		FCDP_RBN	DIF_D8	CC_CLK	MMC_DAT3	MMC_CMD	BC3_N	A9	A5		A0	A_D4		RD_N	A_D16		1	
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T		

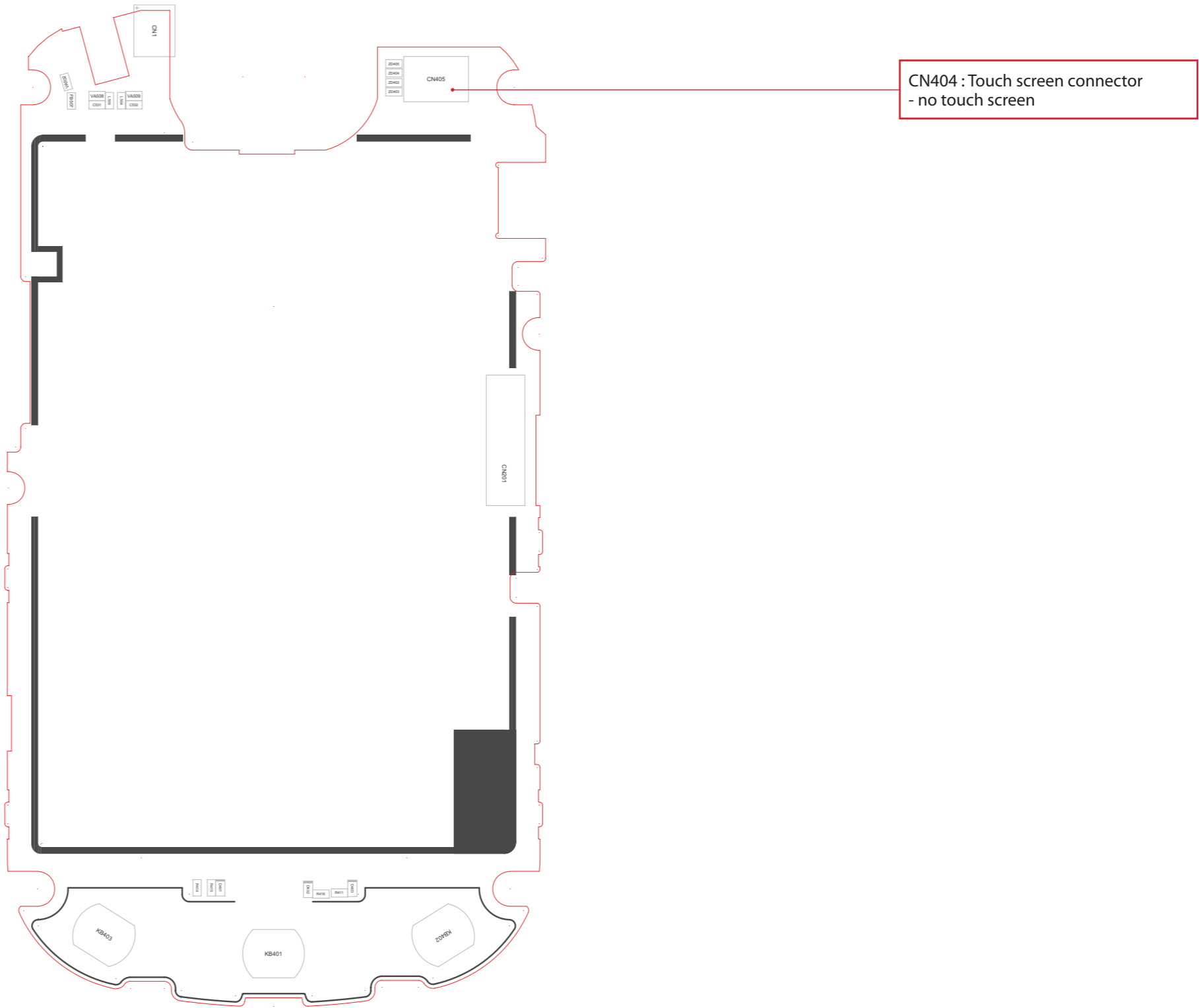
 : not in use

▪ **Ball Diagram (Top View), H9DA2GH1GHMMMR-46M**

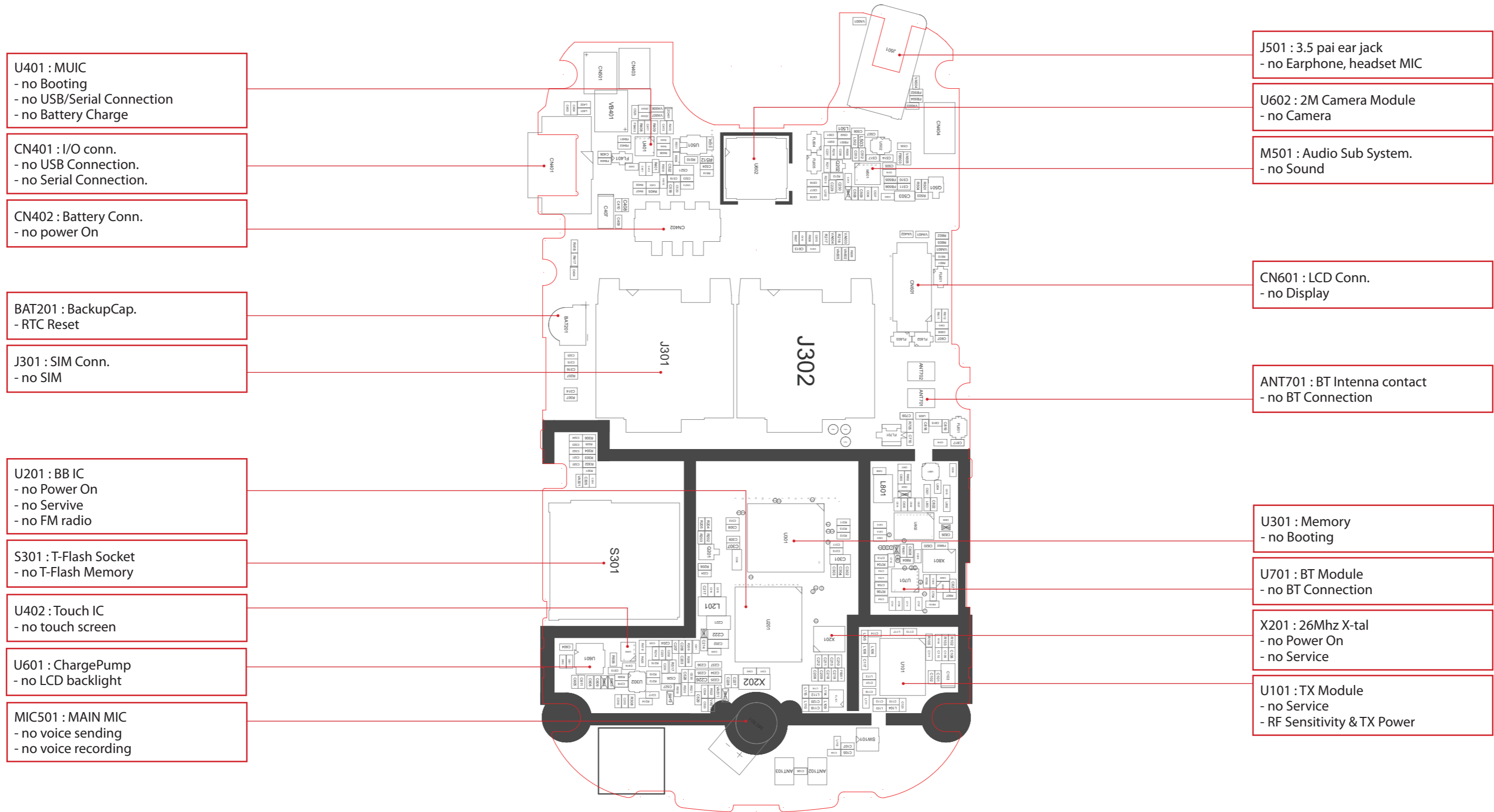
1 2 3 4 5 6 7 8 9 10



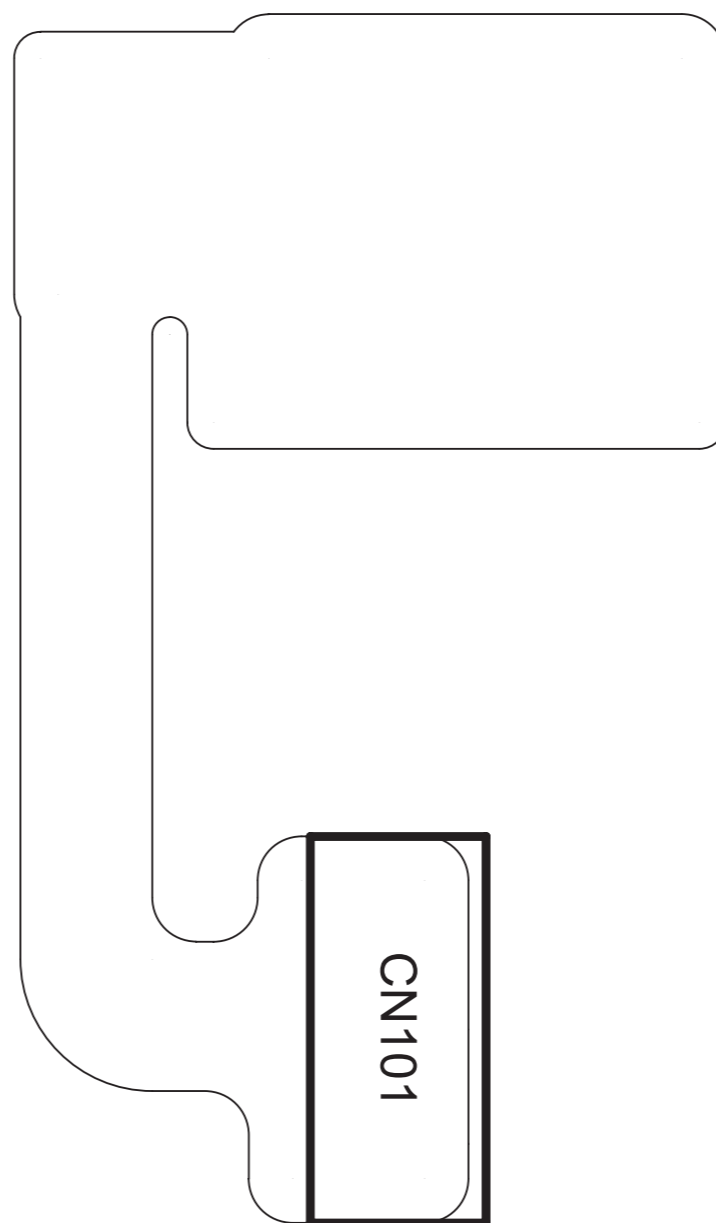
10. PCB LAYOUT



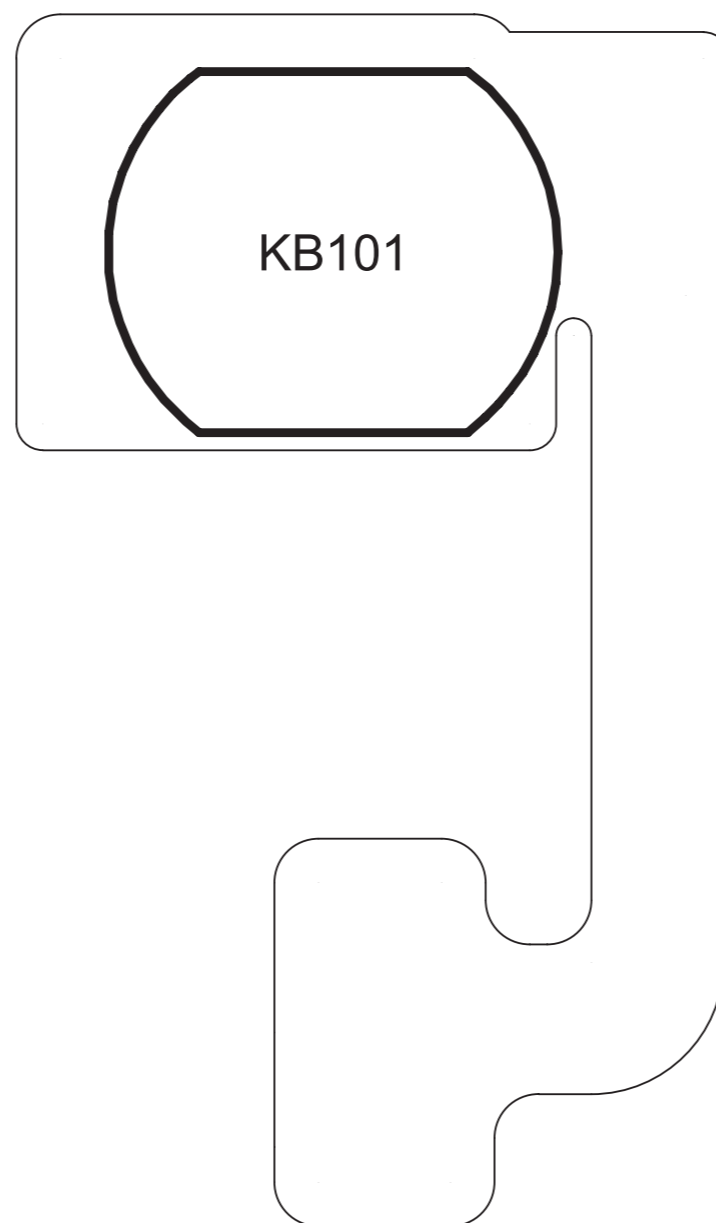
LG-T515_MAIN_EAX64145401_1.0_TOP



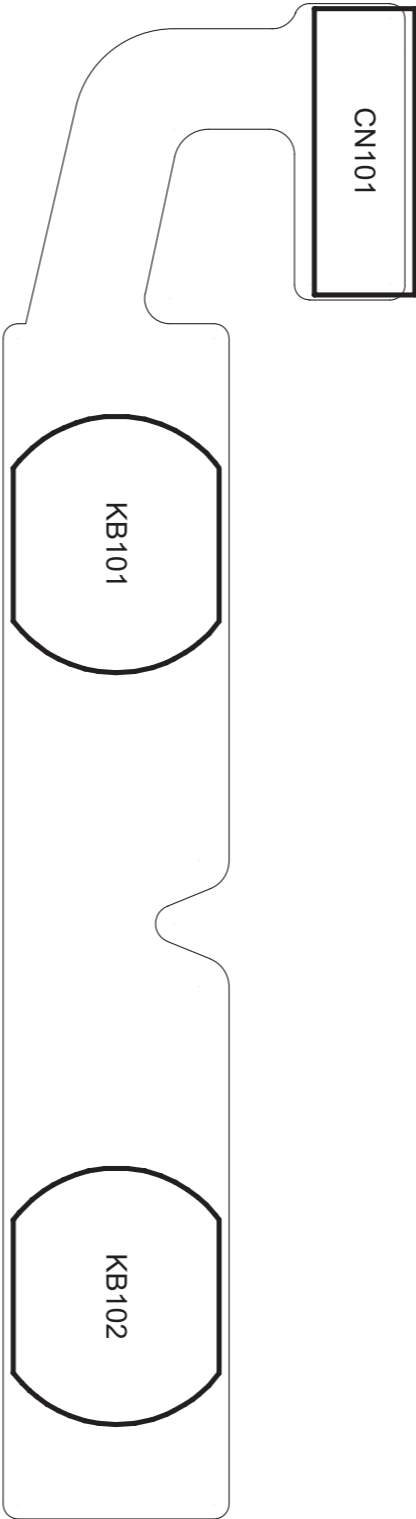
LG-T515_MAIN_EAX64145401_1.0_BOT



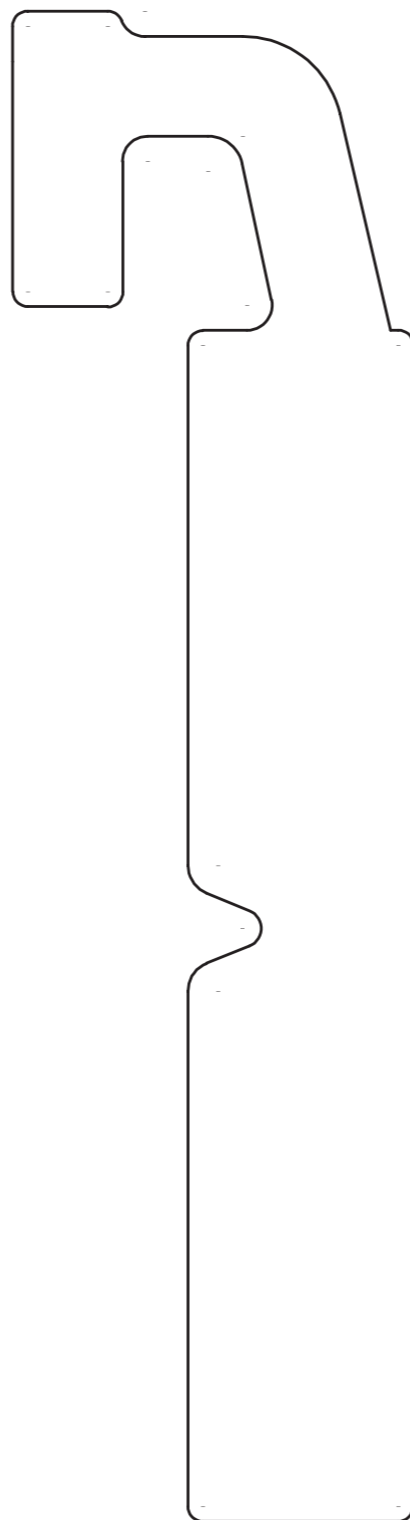
LG-T515_FPCB_F_PWR_1.0_TOP



LG-T515_FPCB_F_PWR_1.0_BOT



LG-T515_FPCB_F_VOL_1.0_TOP



LG-T515_FPCB_F_VOL_1.0_BOT

11.ENGINEERING MODE

Engineering mode is designed to allow a service man/engineer to view and test the basic functions provided by a handset. The key sequence for switching the engineering mode on is "1809#*515#" Select. Pressing END will switch back to non-engineering mode operation. Use Up and Down key to select a menu and press 'select' key to progress the test. Pressing 'back key will switch back to the original test menu.

[1] BB TEST

[1-1] Battery Info

[1-1-1] BattInfo

[1-2] Bluetooth Test

[1-2-1] Enter Test Mode
[1-2-2] OnOff Test
[1-2-3] Headset Test
[1-2-4] BT Test1
[1-2-5] BT Test2
[1-2-6] Xhtml Compose Print
[1-2-7] Xhtml Print Test

[2] Model Version

[2-1] Version

[3] Eng Mode

[3-1] Cell environ.

[3-2] PS Layer Info

[3-2-1] Mobility
[3-2-2] RadioRes
[3-2-1] Gprs

[3-3] Layer1 Info

[3-4] Reset Information

[3-5] Memory Configurion

[3-6] MemGenConf

[3-7] MemAllUse

[3-8] MemDetUse

[3-9] MemDump

[3-10] Change Frequency Band

[4] Call Timer

[5] Factory Reset

[6] MF TEST

[6-1] All Auto Test

[6-2] Backlight

[6-2-1] BacklightOn
[6-2-2] BacklightOff

[6-3] Audio

[6-3-1] Audio Test

[6-4] Vibrator

[6-4-1] VibratorOn
[6-4-2] VibratorOff

[6-5] LCD

[6-5-1] Auto LCD

[6-6] Key pad

[6-7] Mic Speaker

[6-8] Camera

[6-8-1] Camera Main Preview
[6-8-2] FlashOn
[6-8-3] FlashOff
[6-8-4] CameraFlashBunning

[6-9] FM Radio

[6-9-1] FM Radio Test

[7] Network selection

[7-1] Automatic

[7-2] GSM850

[7-3] EGSM

[7-4] DCS

[7-5] PCS

12. STAND ALONE TEST

12.1 Introduction

This manual explains how to examine the status of RX and TX of the model.

A. Tx Test

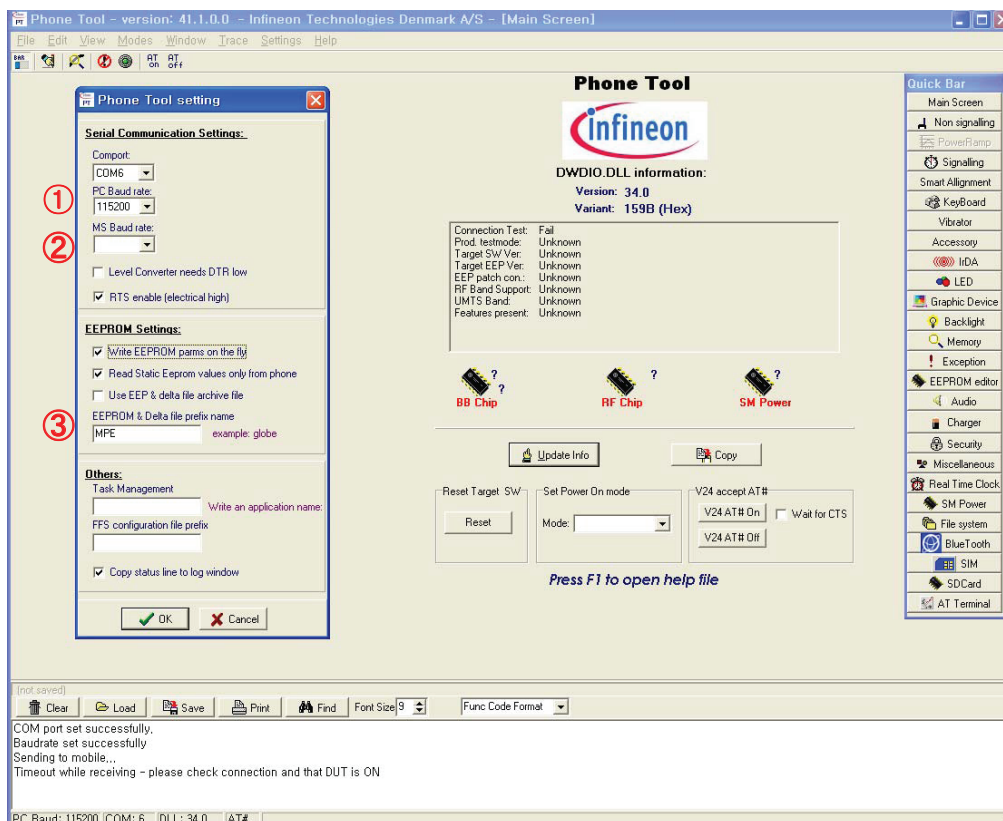
TX test - this is to see if the transmitter of the phones is activating normally.

B. Rx Test

RX test - this is to see if the receiver of the phones is activating normally.

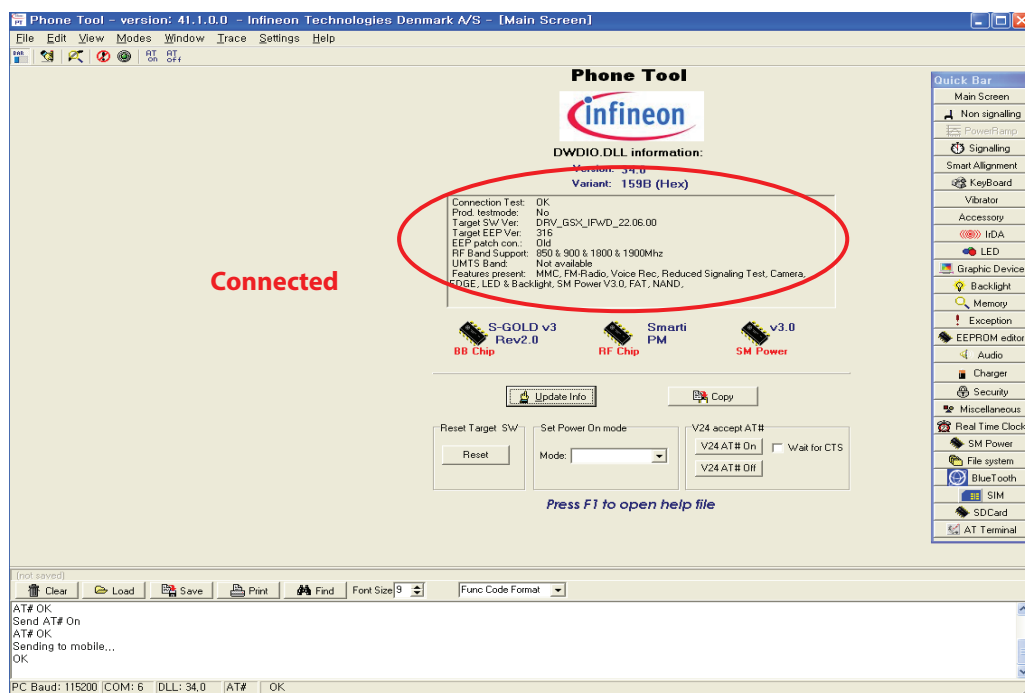
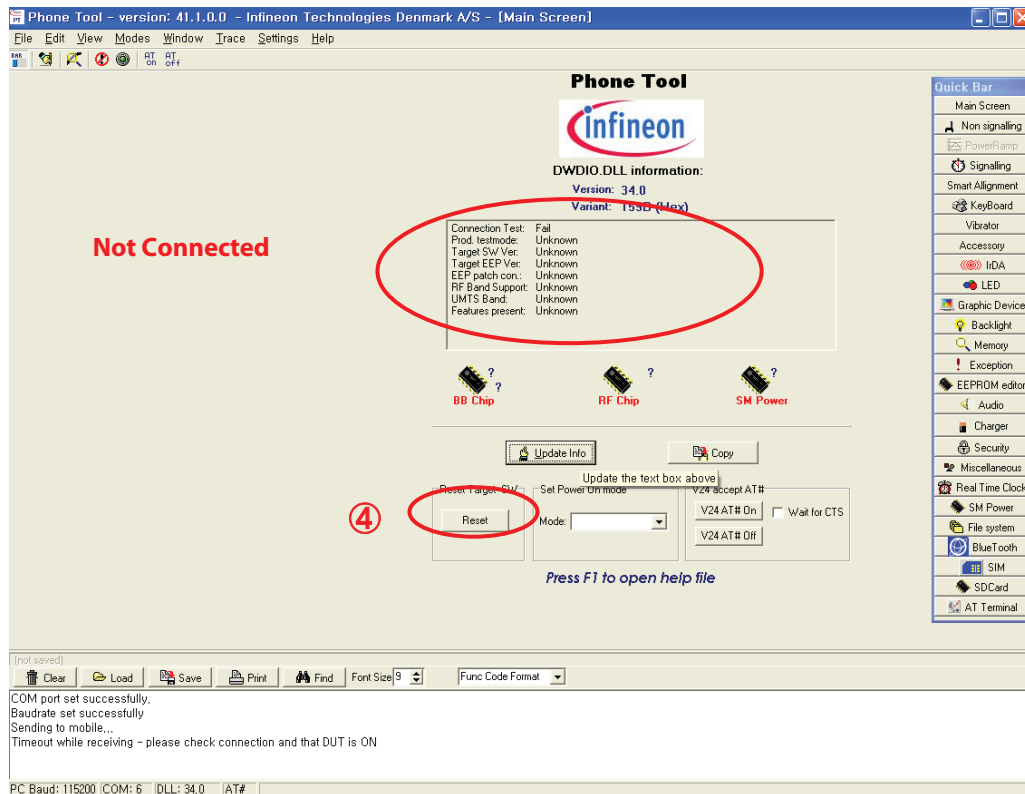
12.2 Setting Method

1. Set COM Port
2. Check PC Bau Rate
3. Confirm EEPROM & Delta file prefix name



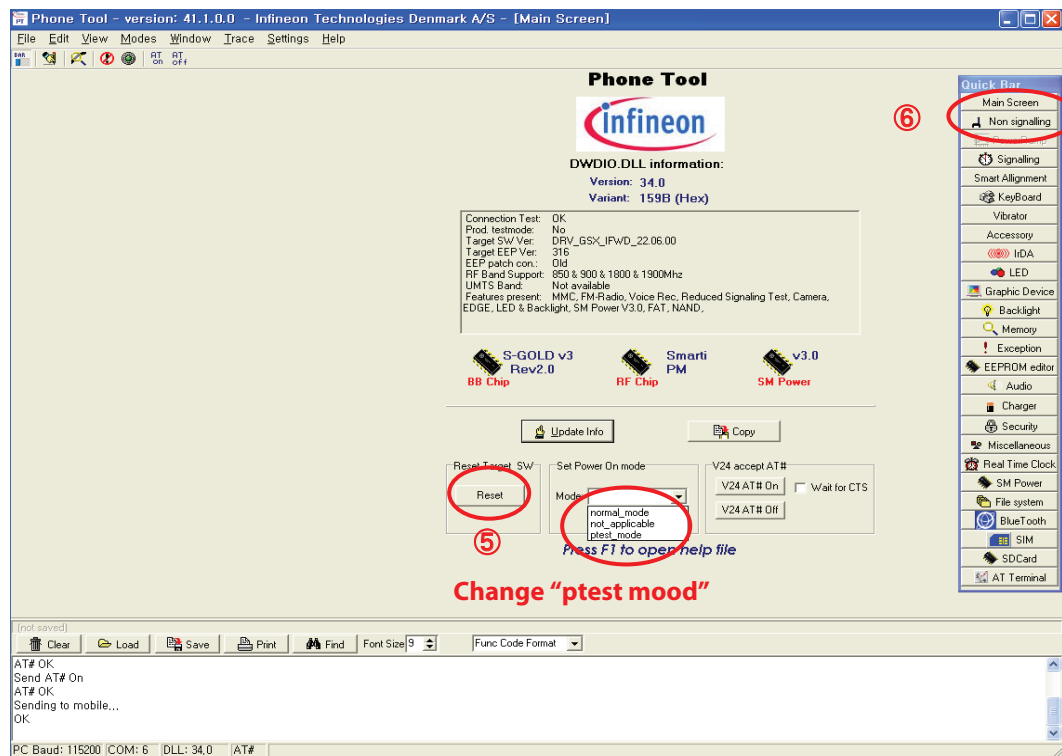
12. STAND ALONE TEST

4. Click "Update Info" for communicating Phone and Test-Program



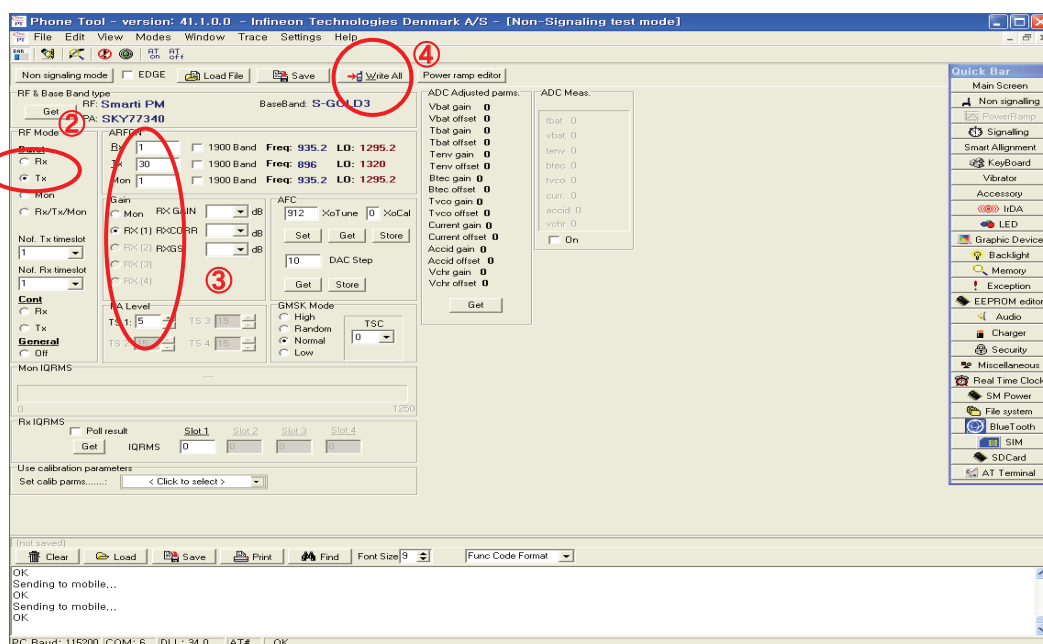
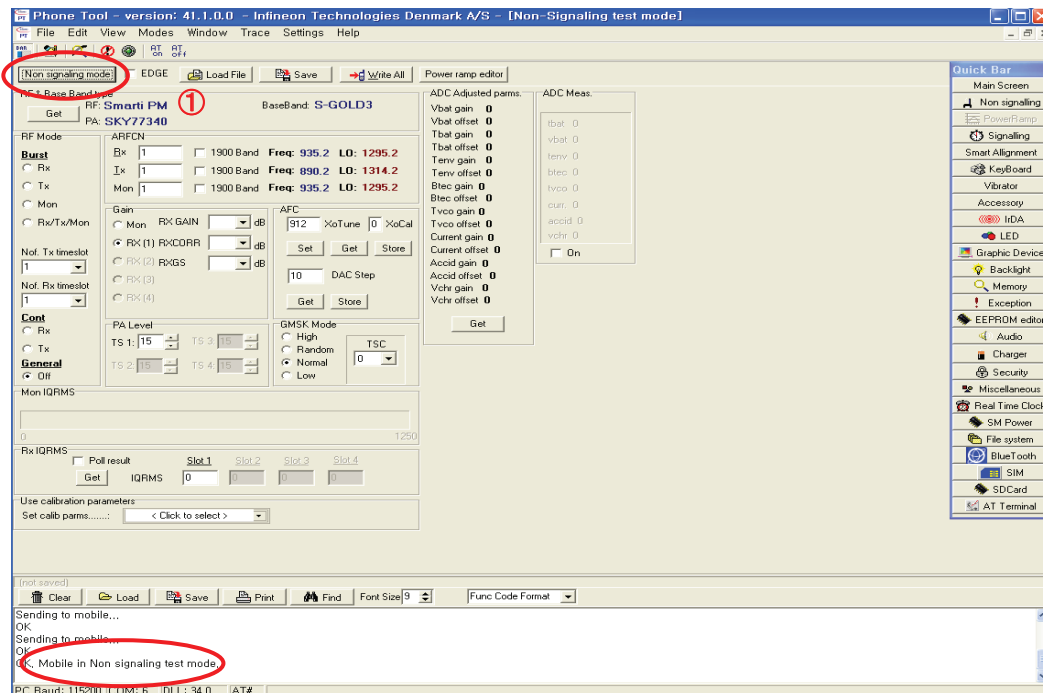
12. STAND ALONE TEST

5. For the purpose of the Standalone Test, Change the Phone to "ptest mode" and then Click the "Reset" bar.
6. Select "Non signaling" in the Quick Bar menu. Then Standalone Test setup is finished.



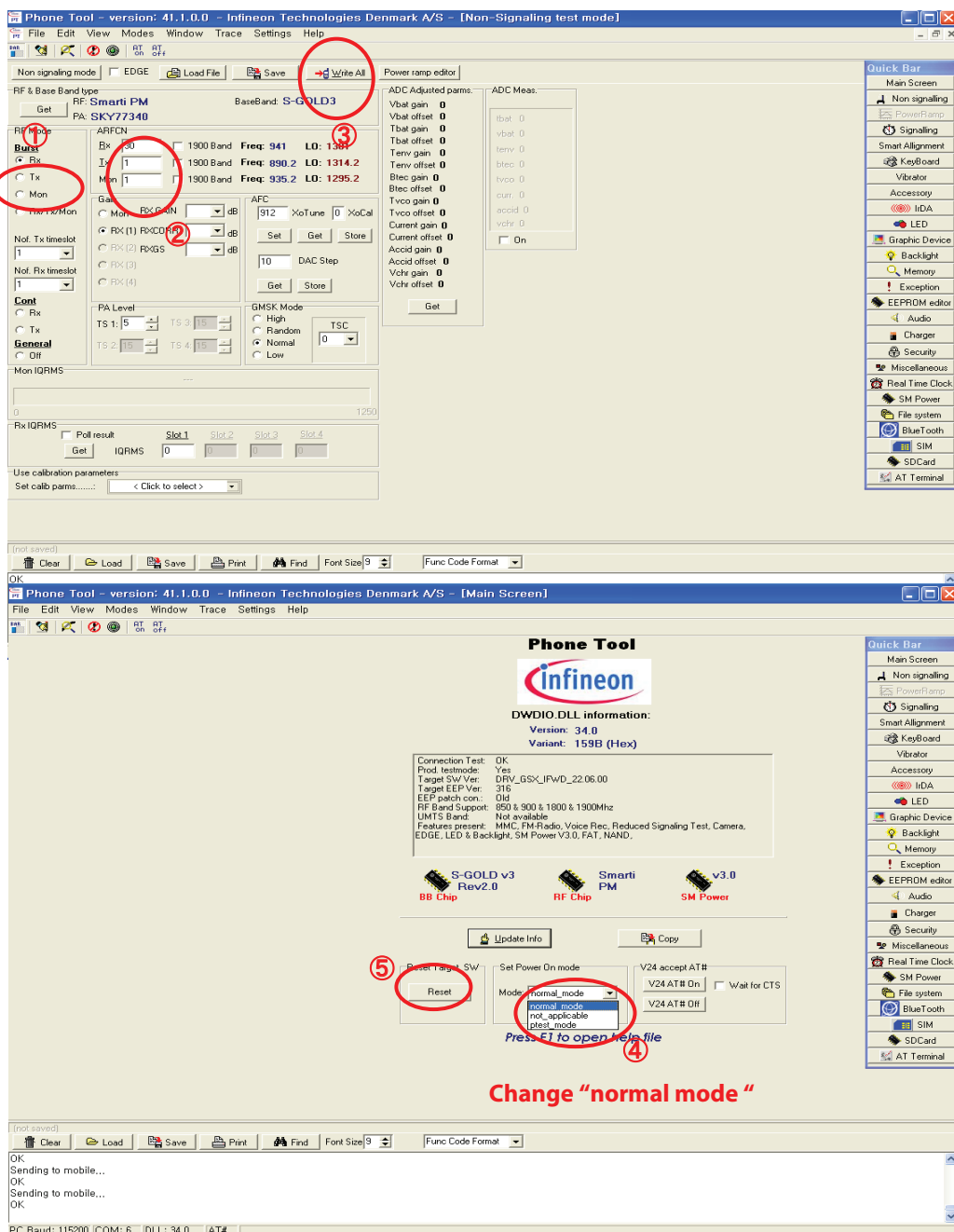
12.3 Tx Test

1. "Non signaling mode" bar and then confirm "OK" text in the command line.
2. Put the number of TX Channel in the ARFCN
3. Select "Tx" in the RF mode menu and "PCL" in the PA Level menu.
4. Finally, Click "Write All" bar and try the efficiency test of Phone.



12.4 Rx Test

1. Put the number of RX Channel in the ARFCN.
2. Select "Rx" in the RF mode menu.
3. Finally, Click "Write All" bar and try the efficiency test of Phone.
4. The Phone must be changed "normal mode" after finishing Test.
5. Change the Phone to "normal mode" and then Click the "Reset" bar.



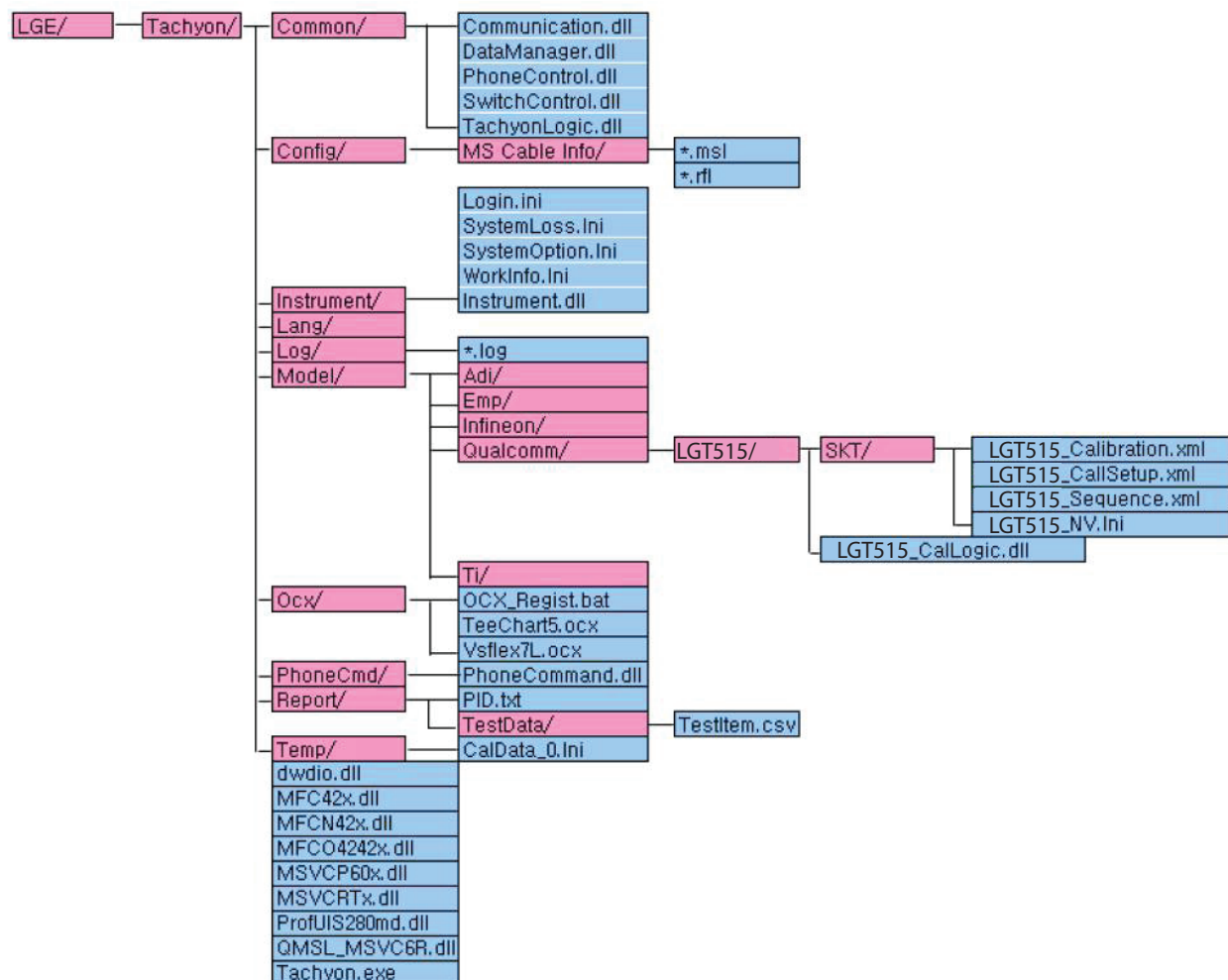
13.AUTO CALIBRATION

13.1 Overview

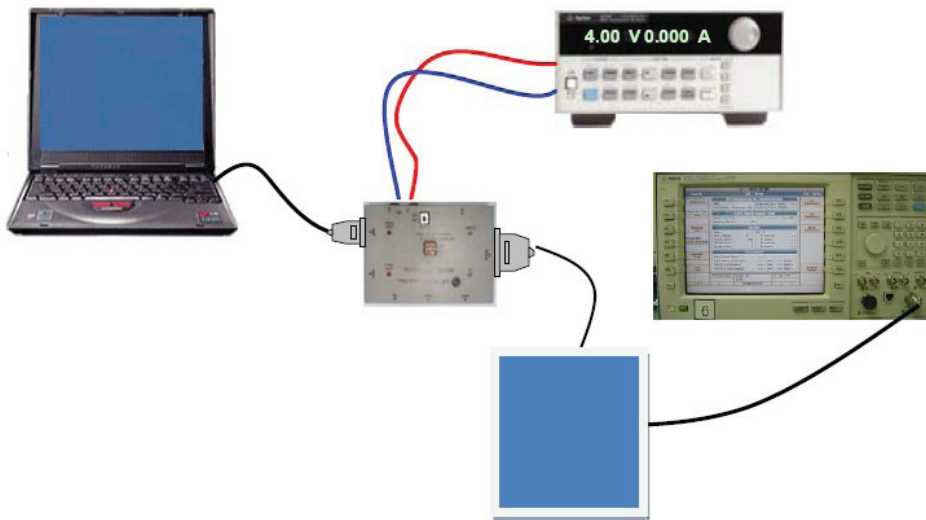
Auto-cal (Auto Calibration) is the PC side Calibration tool that perform Tx, Rx and Battery Calibration with Agilent 8960(GSM call setting instrument) and Tektronix PS2521G(Programmable Power supply).

Auto-cal generates calibration data by communicating with phone and measuring equipment then write it into calibration data block of flash memory in GSM phone.

13.2 Tachyon Directory

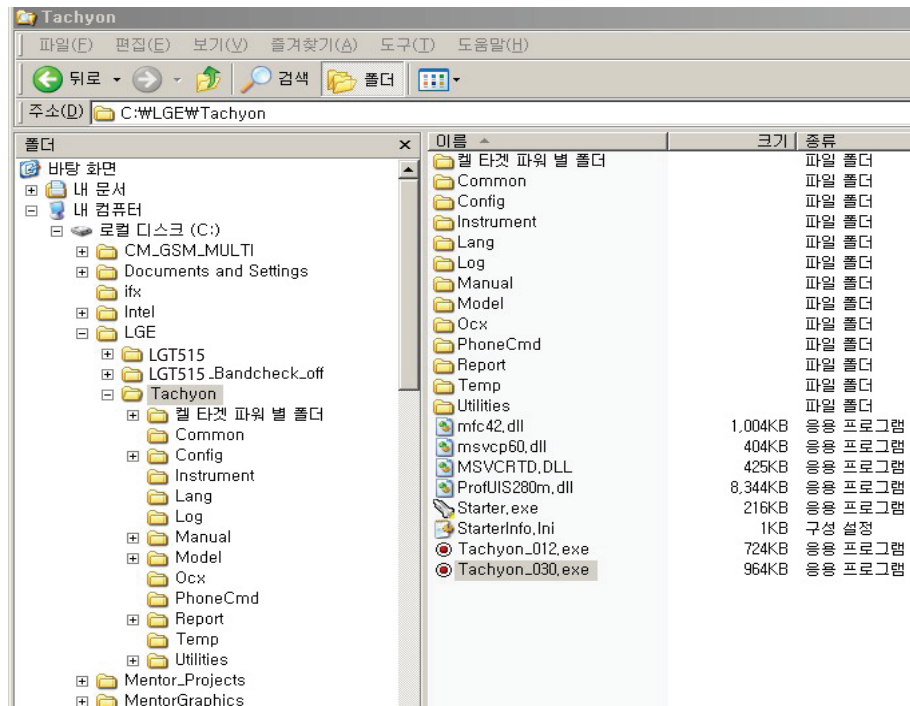


13.3 Test Equipment Setup

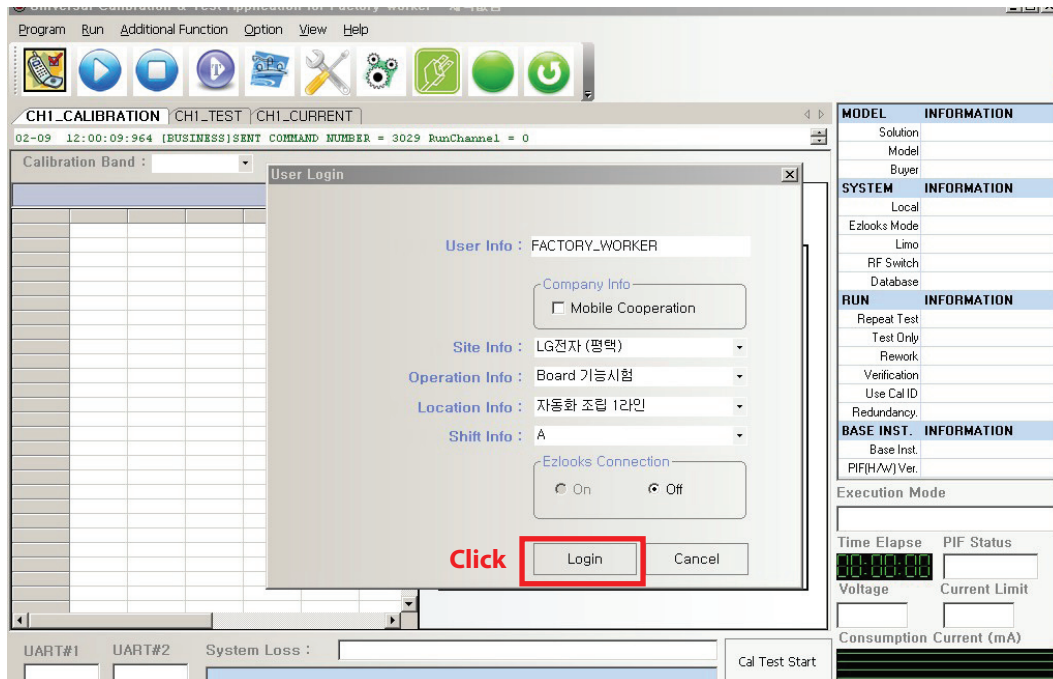


13.4 Procedure

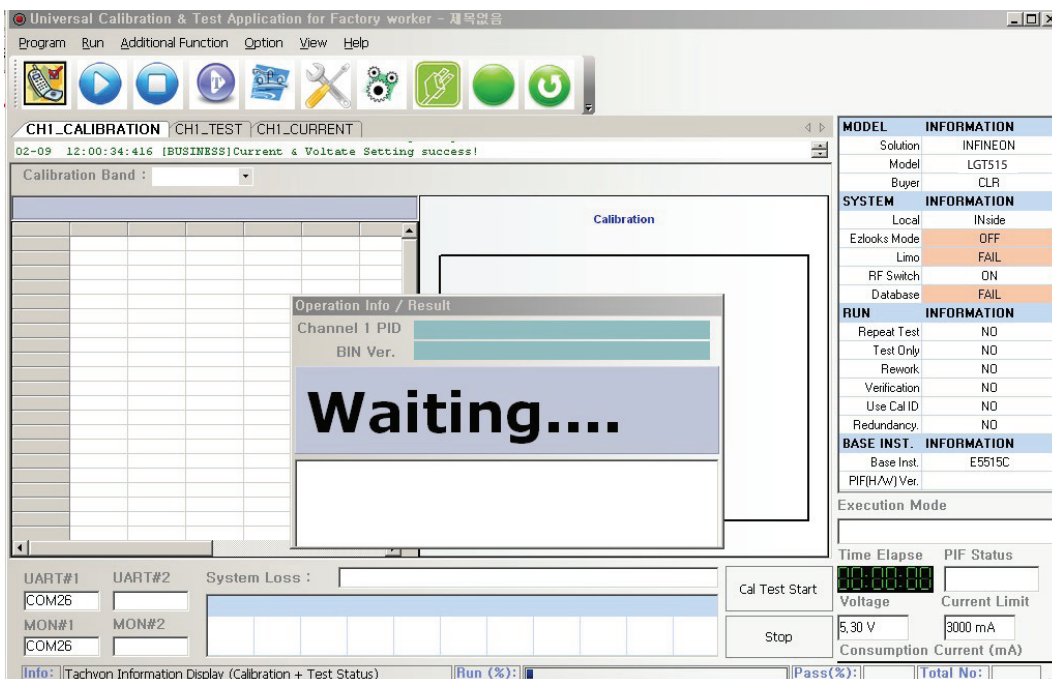
1. Turn on the Phone.
2. "/LGE/Tachyon/Tachyon.exe"



3. Tachyon Login



4. Tachyon Main



5. Tachyon Loss Setting

Universal Calibration & Test Application for Factory worker - 채득없음

Program Run Additional Function Option View Help

CHI_CALIBRATION | CHI_TEST | CHI_CURRENT

02-09 12:00:34:416 [BUSINESS]Current & Voltate Setting success!

Calibration Band : [Dropdown]

Operation Info / Result

Channel 1 PID [Text Box]

BIN Ver. [Text Box]

Waiting....

UART#1 [COM26] UART#2 [Text Box] System Loss : [Text Box]

MON#1 [COM26] MON#2 [Text Box]

RfAmptdOffset

E5515C 연결 확인됨.

NewFile.grf

lgt515.gms

No	Freq. (MHz)	Offset (dB)
1	800	-0.40
2	900	-0.40
3	1000	-0.40
4	1700	-0.60
5	1800	-0.60
6	1900	-0.60
7	2000	-0.60
8	2200	-0.60
9	2500	-0.60
10	2600	-0.60
11	2700	-0.60

[12-4-28]로스값 설정 성공

명령 선택

편집... 파일 선택...

트레이 아이콘 종료

헤카톤 버전 1.0 빌드(2009.11.12)

LossTable

찾는 위치(I): [LossTable]

NewFile.grf

파일 이름(N): [NewFile.grf] 열기(O)

파일 형식(I): [Rf Cable loss file (*.grf)] 취소

LossTable

찾는 위치(I): [LossTable]

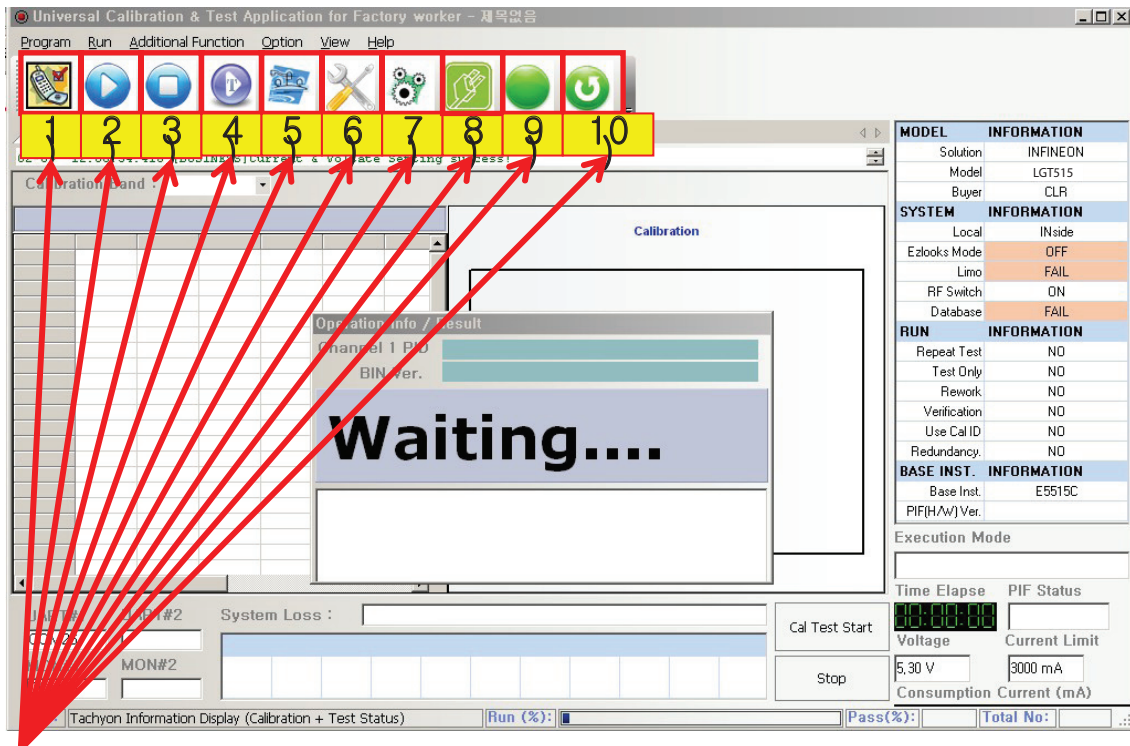
lgt515.gms

파일 이름(N): [lgt515.gms] 열기(O)

파일 형식(I): [Ms Cable loss file (*.gms)] 취소

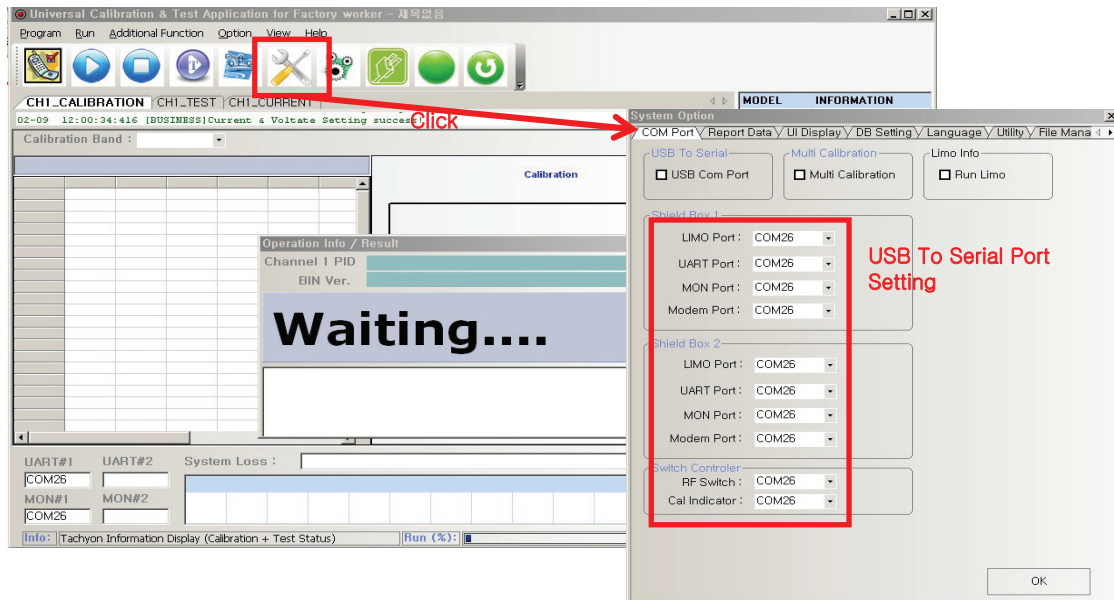
6. Tachyon Setting

(1) Tachyon Main UI

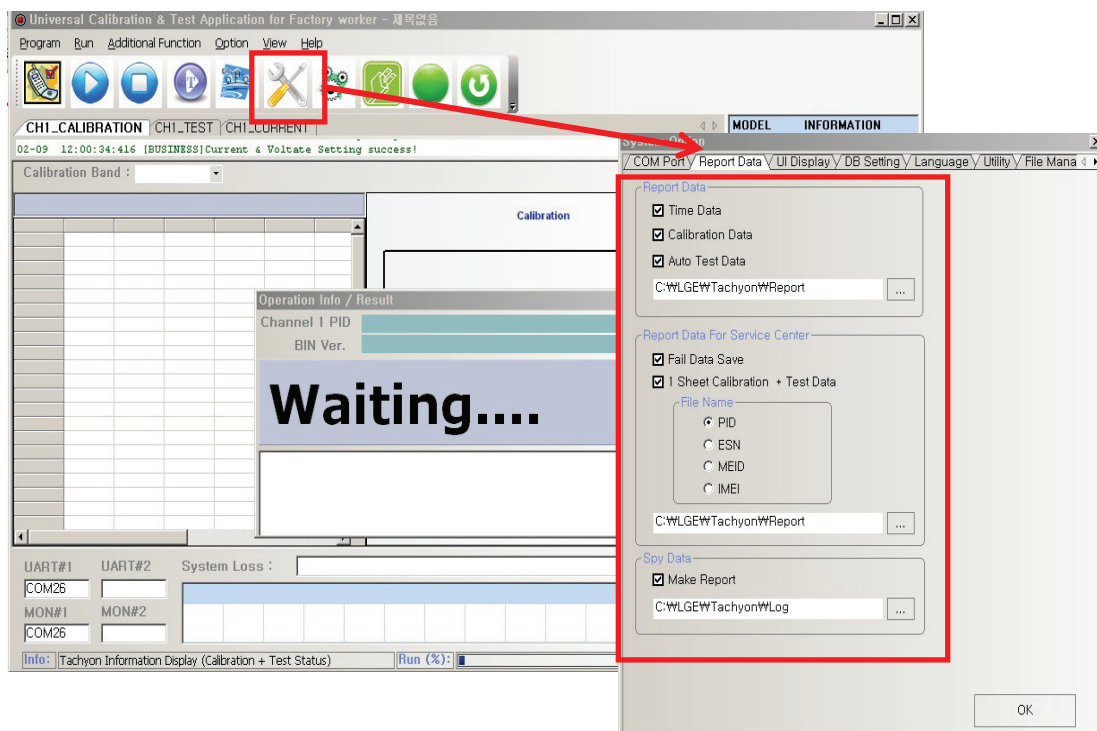


- 1) User Model Selection
- 2) Calibration + Auto Test
- 3) Stop
- 4) Auto Test Only
- 5) Loss Setting
- 6) System Option Setting
- 7) Running Option Setting
- 8) Voltage Current Setting
- 9) Show Result Window
- 10) Click after setting

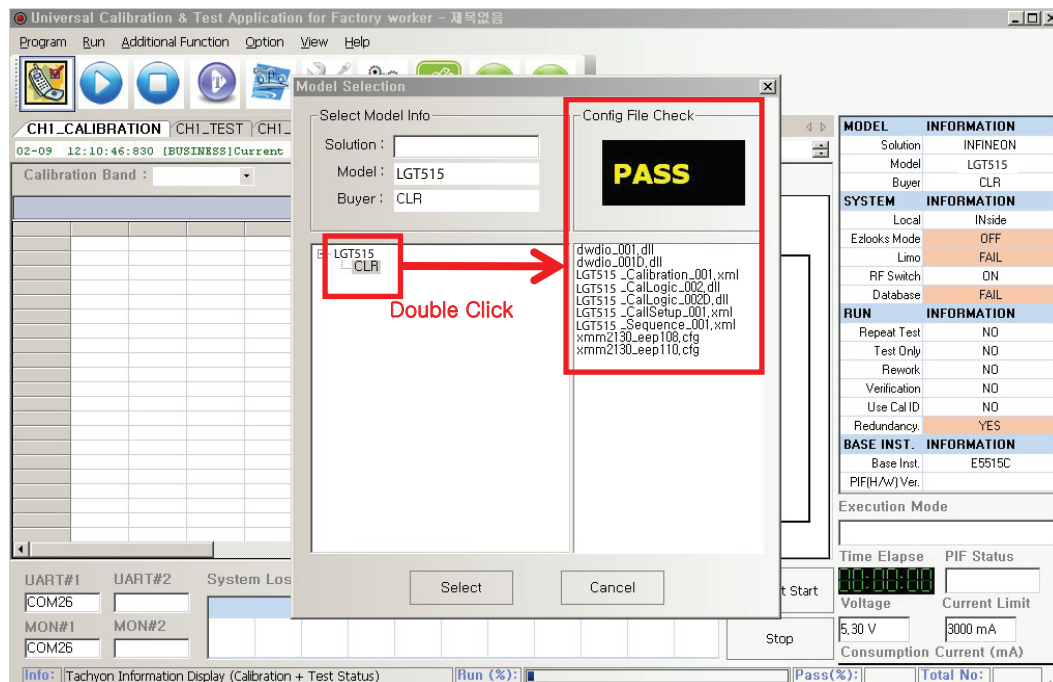
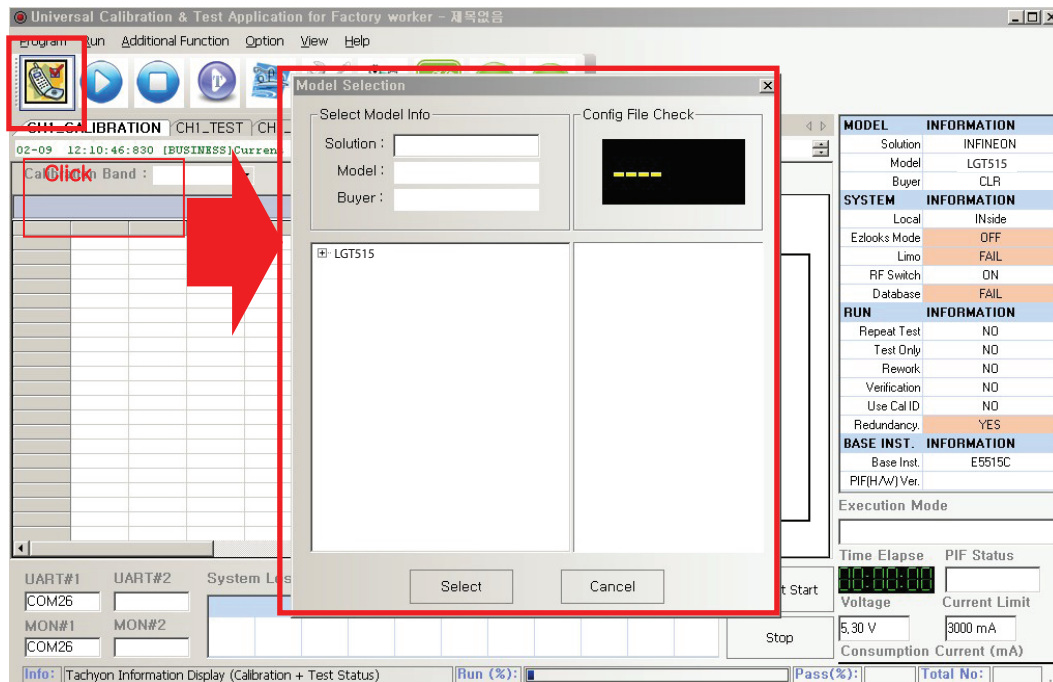
(2) Click "System Option Setting" Menu



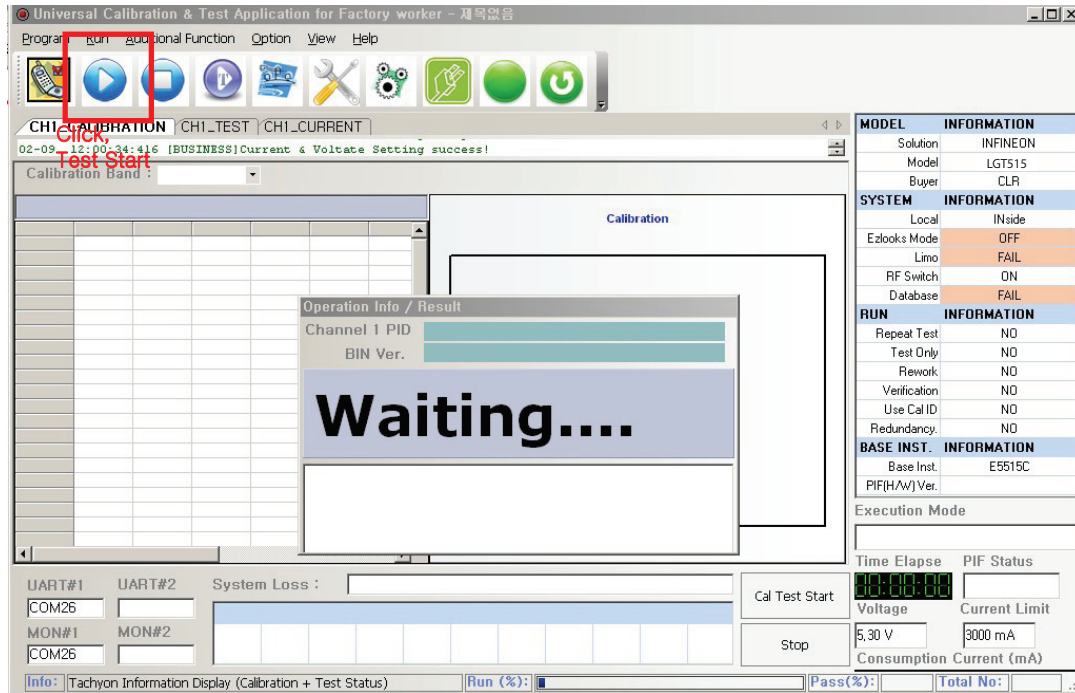
(3) Report Data



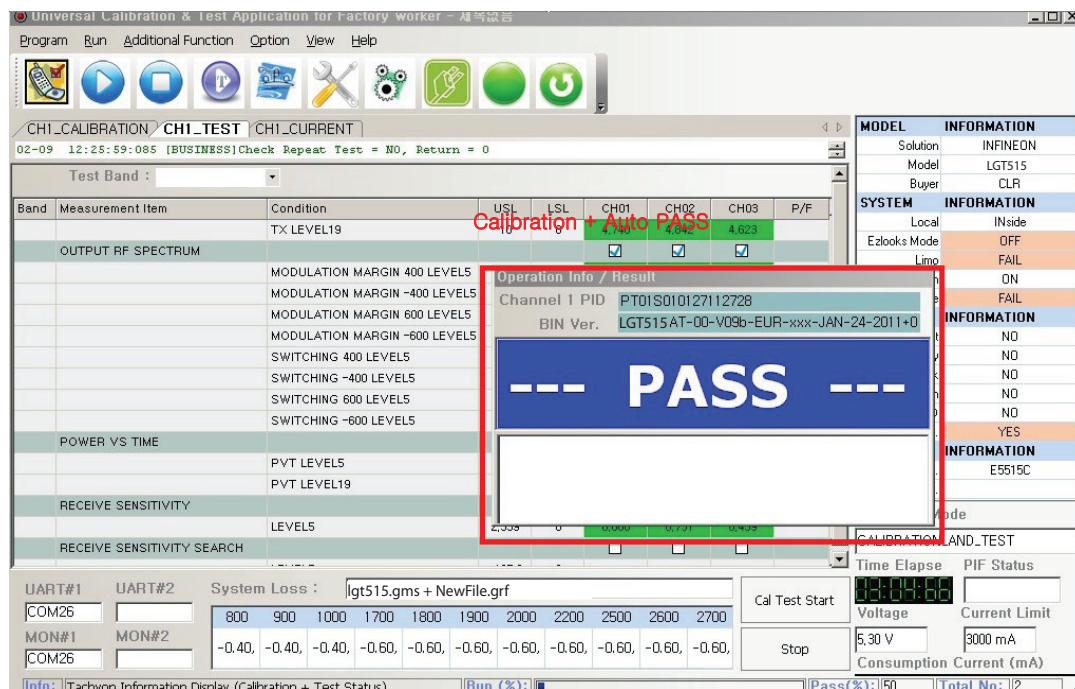
7. Click "User Model Selection" Menu



8. Tachyon RF Calibration Start



9. Tachyon RF Calibration finishes.



13.5 AGC

This procedure is for Rx calibration.

In this procedure, We can get RSSI correction value. Set band EGSM and press Start button the result window will show correction values per every power level and gain code and the same measure is performed per every frequency.

13.6 APC

This procedure is for Tx calibration.

In this procedure you can get proper scale factor value and measured power level.

13.7 ADC

This procedure is for battery calibration.

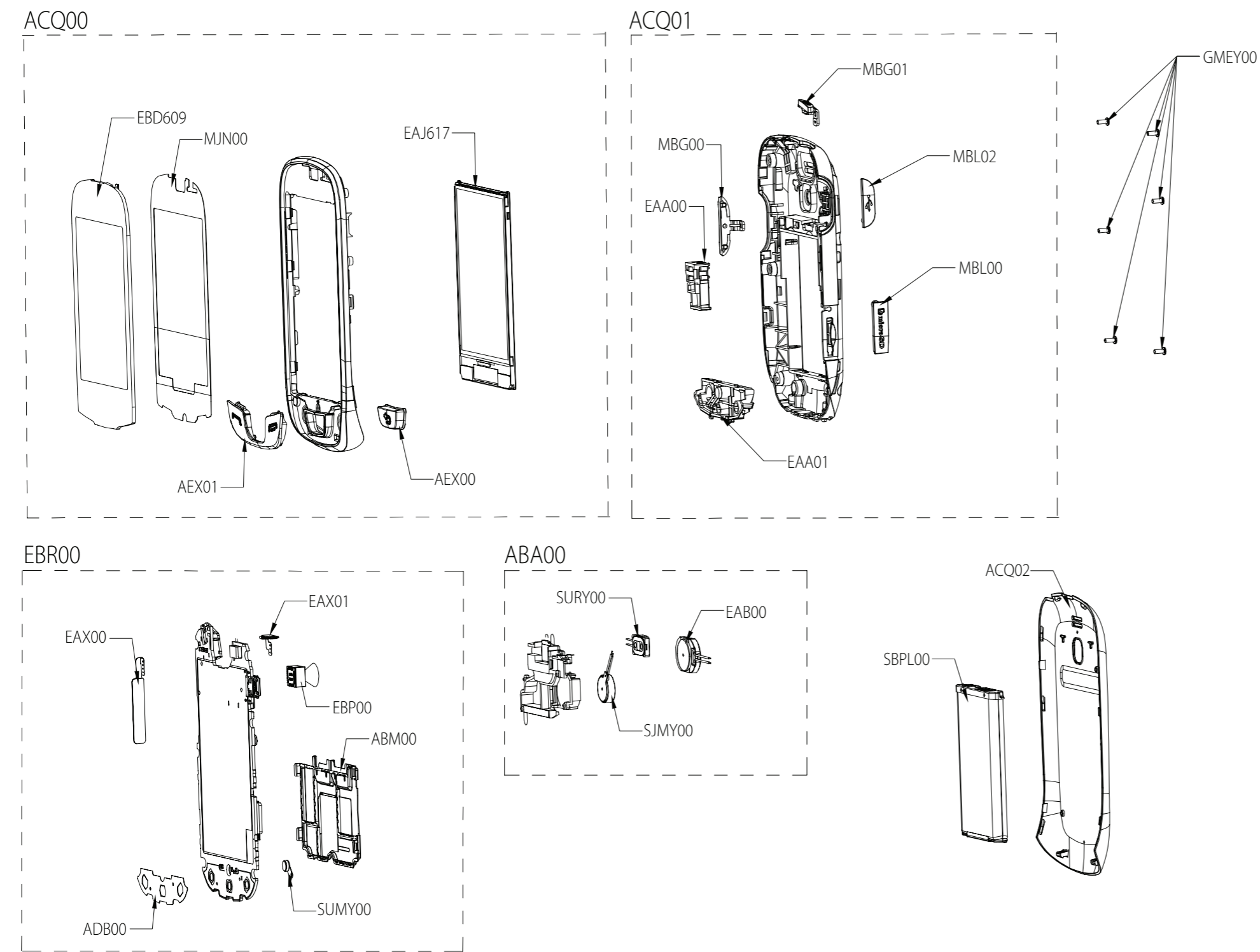
You can get main Battery Config Table and temperature Config Table will be reset.

13.8 Target Power

BAND	Description	Low	Middle	High
GSM 850	Channel	128	191	251
	Frequency	824.2 MHz	836.8 MHz	848.8 MHz
	Max power	32.8 dBm	32.8 dBm	32.8 dBm
EGSM 900	Channel	975	37	124
	Frequency	880.2 MHz	897.4 MHz	914.8 MHz
	Max power	32.8 dBm	32.8 dBm	32.8 dBm
DCS1800	Channel	512	699	885
	Frequency	1710.2 MHz	1747.6 MHz	1784.8 MHz
	Max power	29.8 dBm	29.8 dBm	29.8 dBm
PCS 1900	Channel	512	661	810
	Frequency	1850.2 MHz	1880 MHz	1909.8 MHz
	Max power	29.8 dBm	29.8 dBm	29.8 dBm

14. EXPLODED VIEW & REPLACEMENT PART LIST

14.1 EXPLODED VIEW



Location	Description
GMEY00	Screw,Machine
ACQ01	Cover Assembly,Rear
EAA01	PIFA Antenna,Multiple
EAA00	PIFA Antenna,Bluetooth
MBG00	Button
MBG01	Button
MBL00	Cap
MBL02	Cap
EBR00	PCB Assembly,Main
EBP00	Camera Module
ABA00	Bracket Assembly
EAB00	Speaker,Dual Mode
EAX00	PCB,Sidekey
ADB00	Dome Assembly,Metal
ABM00	Can Assembly,Shield
EAX01	PCB,Sidekey
SURY00	Receiver
SUMY00	Microphone,Condenser
SJMY00	Motor,DC
AEX01	Keypad Assembly,Main
ACQ00	Cover Assembly,Front
MJN00	Tape,Window
EBD609	Touch Window Assembly
AEX00	Keypad Assembly,Sub
EAJ617	LCD,Module-TFT
ACQ02	Cover Assembly,Battery
SBPL00	Mobile Phone Battery Li-Ion

14. EXPLODED VIEW & REPLACEMENT PART LIST

14.2 Replacement Parts <Mechanic component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
1	AGQ000000	Phone Assembly	AGQ86490701	LGT515.AINDUK ZY:Color Unfixed -	
2	ACQ100400	Cover Assembly, EMS	ACQ85558501	LGT515.AINDUK ZY:Color Unfixed -	
3	GMEY00	Screw, Machine	GMEY0014301	GMEY0014301 BH + 1.4mm 3.5mm MSWR NI PLT N - KUMGANG SCREW CO., LTD	
3	ACQ01	Cover Assembly, Rear	ACQ85531001	LGT510.AINDZY UK:URBAN BLACK -	
4	EAA01	PIFA Antenna, Multiple	EAA62604601	KI-M08644 QUAD -2DB 5 Metal Stamping Type - KOMATECH CO., LTD	
4	EAA00	PIFA Antenna, Bluetooth	EAA62604702	ACA-00153 SINGLE -2DB 5 Metal Stamping Type - MOBITECH CORPORATION	
4	MEZ000900	Label, After Service	MLAB0001102	COMPLEX C2000 CGRSV WA:White C2000 USASV DIA 4.0 PRINTING,	
4	MKC009400	Window, Camera	MKC64019401	COMPLEX LGT510.AINDZY TR:Transparent -	
4	MJN061101	Tape, Protect	MJN67852101	COMPLEX LGT510.AINDZY GE:GREEN BLUE -	
4	MJN061100	Tape, Protect	MJN67852001	COMPLEX LGT510.AINDZY GE:GREEN BLUE -	
4	MJN089300	Tape, Window	MJN67808701	COMPLEX LGT510.AINDZY TR:Transparent -	
4	MDJ000000	Filter	MDJ63144201	COMPLEX LGT510.AINDZY BK:Black -	
4	MCQ049800	Damper, Motor	MCQ66606301	COMPLEX LGT510.AINDZY BK:Black -	
4	MCQ074200	Damper, Speaker	MCQ66606201	COMPLEX LGT510.AINDZY BK:Black -	
4	MCQ000000	Damper	MCQ66606101	COMPLEX LGT510.AINDZY BK:Black -	
4	MCQ009400	Damper, Camera	MCQ66606001	COMPLEX LGT510.AINDZY BK:Black -	
4	MCK063300	Cover, Rear	MCK66727501	MOLD PC LGT510.AINDZY UK:URBAN BLACK -	
4	MCQ000001	Damper	MCQ66697301	COMPLEX LGT510.AINDUK BK:Black -	
4	MBG00	Button	MBG64263201	MOLD PC LGT510.AINDZY UK:URBAN BLACK -	
4	MBG01	Button	MBG64263301	MOLD PC LGT510.AINDZY UK:URBAN BLACK -	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
4	MBL00	Cap	MBL64937901	COMPLEX LGT510.AINDZY UK:URBAN BLACK -	
4	MBL049500	Cap, Mobile Switch	MBL64938001	COMPLEX LGT510.AINDZY UK:URBAN BLACK -	
4	MBL02	Cap	MBL64938101	COMPLEX LGT510.AINDZY UK:URBAN BLACK -	
3	EBR00	PCB Assembly, Main	EBR73541601	LGT515.AINDUK 1.0 Main	
4	EBR071800	PCB Assembly, Main, SMT	EBR73541701	LGT515.AINDUK 1.0 Main	
5	EBR071700	PCB Assembly, Main, SMT Top	EBR73528601	LGT515.AINDUK 1.0 Main	
6	EAX010000	PCB, Main	EAX64145401	LGT510.AINDZY 1.0 FR-4 SBL 6 1.0 Main	
5	EBR071600	PCB Assembly, Main, SMT Bottom	EBR73528501	LGT515.AINDUK 1.0 Main	
6	EBP00	Camera Module	EBP61321701	C2FD-H367A C2FD-H367A 2M hynix 1/5 LG INNOTEK CO., LTD	
5	MEZ002100	Label	MLAZ0038301	COMPLEX LG-VX6000 ZZ:Without Color PID Label 4 Array PRINTING,	
4	EBR071500	PCB Assembly, Main, Insert	EBR73707701	LGT510.AINDUK 1.0 Main	
5	ABA00	Bracket Assembly	ABA74048601	LGT510.AINDZY BK:Black -	
6	MJN000001	Tape	MJN67831401	COMPLEX LGT510.AINDZY TR:Transparent -	
6	MAZ000000	Bracket	MAZ63144801	MOLD PC LGT510.AINDZY BK:Black -	
6	MJN000000	Tape	MJN67829601	COMPLEX LGT510.AINDZY TR:Transparent -	
6	MJN000004	Tape	MJN67831601	COMPLEX LGT510.AINDZY TR:Transparent -	
6	MJN000003	Tape	MJN67851701	COMPLEX LGT510.AINDZY TR:Transparent -	
6	MJN000002	Tape	MJN67831501	COMPLEX LGT510.AINDZY TR:Transparent -	
5	EAB00	Speaker, Dual Mode	EAB62308201	Nd-Fe-B 700mW 8OHM 91DB 720HZ 1812*3.0T wire 15mm DCCA coil WIRE	
5	EAX00	PCB, Sidekey	EAX64224101	LGT510.AINDZY 1.0 POLYI Double 2 0.4 Sidekey	
5	MDS000000	Gasket	MDS63738901	COMPLEX LGT510.AINDUK GD:Gold -	
5	MCQ043300	Damper, LCD	MCQ66668801	COMPLEX LGT510.AINDZY BK:Black -	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
5	ADB00	Dome Assembly, Metal	ADB73678501	LGT510.AINDZY SV:Silver -	
5	ABM00	Can Assembly, Shield	ABM73616801	LGT510.AINDUK SV:Silver -	
6	MBK070300	Can, Shield	MBK62972701	PRESS SUS 0.3 LGT510.AINDZY SV:Silver -	
6	MKU101700	Absorber, Electromagnetic Wave	MKU30343201	COMPLEX LGT510.AINDUK ZY:Color Unfixed -	
5	EAX01	PCB, Sidekey	EAX64224201	LGT510.AINDZY 1.0 POLYI Double 2 0.4 Sidekey	
5	RAA050100	Resin, PC	BRAH0001301	UF-1060	
5	SURY00	Receiver	SURY0010120	KR120703W1P ASSY, dB, ohm, 1207*2.5T, 10mm, WIRE, KIRYN TELECOM CO., LTD	
5	SUMY00	Microphone, Condenser	SUMY0003816	OBM-410L44-RC1882 -44DB 2.2KOHM OMNI 1T010V 4x1.0t FPCB BSE CO., LTD.	
5	SJMY00	Motor, DC	SJMY0007104	3V 80mA 0A 12KRPM 0RPM 0SEC 0GF.CM 0OHM	
3	ACQ003400	Cover Assembly, Bar	ACQ85512405	LGT515.AINDUK UK:URBAN BLACK -	
4	AEX01	Keypad Assembly, Main	AEX73737401	LGT510.AINDZY UK:URBAN BLACK -	
4	MEZ000000	Label	MLAZ0038303	COMPLEX LG-LC3200 WA:White PRINTING, PPRI PRINTING	
4	MJN061104	Tape, Protect	MJN67907001	COMPLEX LGT510.AINDUK TR:Transparent -	
4	MJN061101	Tape, Protect	MJN67906901	COMPLEX LGT510.AINDUK GE:GREEN BLUE -	
4	MJN061100	Tape, Protect	MJN67867201	COMPLEX LGT510.AINDZY GE:GREEN BLUE -	
4	ACQ00	Cover Assembly, Front	ACQ85530801	LGT510.AINDZY UK:URBAN BLACK -	
5	MCK032700	Cover, Front	MCK66726801	MOLD PC LGT510.AINDZY UK:URBAN BLACK -	
5	MCQ000000	Damper	MCQ66605801	COMPLEX LGT510.AINDZY BK:Black -	
5	MCQ043300	Damper, LCD	MCQ66605901	COMPLEX LGT510.AINDZY BK:Black -	
5	MJN00	Tape, Window	MJN67807901	COMPLEX LGT510.AINDZY BK:Black -	
5	MET099500	INSERT, NUT	MICE0016907	MECH_COMMON ZY, ZZ, PRESS, STS, , , , ,	
5	MDQ000000	Frame	MDQ62956601	PRESS SUS 0.4 LGT510.AINDZY SV:Silver -	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
5	MCQ000001	Damper	MCQ66627001	COMPLEX LGT510.AINDZY BK:Black -	
5	MJN000000	Tape	MJN67834201	COMPLEX LGT510.AINDZY TR:Transparent -	
4	EBD609	Touch Window Assembly	EBD60946801	RESISTIVE TOUCH F-F-P None 2.8inch Contact Type -	
4	AEX00	Keypad Assembly, Sub	AEX73737601	LGT510.AINDZY UK:URBAN BLACK -	
4	EAJ617	LCD, Module-TFT	EAJ61771701	LM283DN2A QVGA 2.8INCH 240X320 400CD COLOR 70% 4/3 500:1 60Hz Inverter N - TOVIS	
4	MJN061103	Tape, Protect	MJN67988601	COMPLEX LGT510.ATURUK TR:Transparent -	
2	MEZ002100	Label, Approval	MLAA0062316	COMPLEX GU280 OREBK ZZ:Without Color COMPLEX, (empty), , , , ,	
1	AAD000000	Addition Assembly	AAD85873101	LGT515.AINDUK UK:URBAN BLACK -	
2	ACQ02	Cover Assembly, Battery	ACQ85636301	LGT510.AINDUK UK:URBAN BLACK -	
3	MCK004100	Cover, Battery	MCK66727601	MOLD PC LGT510.AINDZY UK:URBAN BLACK -	
1	AGF000000	Package Assembly	AGF76280603	LGT515.AINDUK ZZ:Without Color LG-T515 IND(TR1-1H/IND_UB/MRP_LB/Seal/6WD/500EA)	
2	MAY084000	Box, Unit	MAY65139126	BOX Paper 160 59 120 5 COLOR LGT515.AINDUK ZZ:Without Color LG-T515 IND(TR1-1HW/English)	
2	MAF086500	Bag, Vinyl	MBAD0005204	COMPLEX LG-LX260 SPRAG ZZ:Without Color -	
2	MAY047100	Box, Master	MBEE0059801	COMPLEX KS360.AACNRD ZZ:Without Color TR1-1(=S1T.GSP1, 2.T3) Master Box	
2	MEZ047200	Label, Master Box	MLAJ0004402	PRINTING CG300 CGR DG ZZ:Without Color LABEL MASTER BOX(for CGR TDR 2VER. mbox_label) GSM standard_master box label	
2	MEZ084000	Label, Unit	MLAP0001138	PRINTING LG-RD6100 RLC ZZ:Without Color GSM standard_Seal label	
2	MEZ084100	Label, Unit Box	MLAQ0015213	PRINTING KG270 INDBK ZZ:Without Color GSM MRP LABEL-Made by LGE(100*48) IND MRP_unit box label	
2	MEZ000000	Label	MLAZ0050901	COMPLEX KU990.AGBRBK ZZ:Without Color Battery Warning Label (Lithium ion Battery Label)	
2	AGJ000000	Pallet Assembly	AGJ73418301	LGA230.AINDZY ZZ:Without Color TR1-1 6side pallet (6Ply-WD pallet+Sleeve_500ea) Assy.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
3	MGA000000	Pallet	MGA62599501	COMPLEX LGA230.AINDZY ZZ:Without Color TR1-1 6Ply-WD pallet (6side wooden pallet new type)	
3	MPBZ00	Damper	MPBZ0219601	COMPLEX KM500 ROMBB ZZ:Without Color -	

14. EXPLODED VIEW & REPLACEMENT PART LIST

14.2 Replacement Parts <Main component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
6	L504, L505	Inductor, Multilayer, Chip	ELCH0003842	LQG15HSR10J02D 100NH 5% - 150mA 1.25OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	CN405	Connector, Terminal Block	ENZY0020701	KQ13L-4R 4P 2.7 ANGLE SMD R/TP - HIROSE KOREA CO., LTD	
6	R411, R414, R415, R416	Resistor, Chip	ERHZ0000505	MCR01MZP5J681 680OHM 5% 1/16W 1005 R/TP - ROHM.	
6	ZD402, ZD403, ZD404, ZD405	Varistor	SEVY0003901	EVL5M02200 5.5V 0% 480F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	D401, D402, D403	Diode, TVS	EDTY0009401	VMNZ6.8CST2R 5.78V 0 10V 0A 100mW VMN2 R/TP 2P 1 ROHM.	
6	VA502	Varistor	SEVY0005201	EVL5C502050 5.5V 0% 50F 1.0*0.5*0.6 - SMD R/TP AMOTECH CO., LTD.	
6	VA508, VA509	Diode, TVS	EDTY0012501	UCLAMP3311T.TCT SLP1006P2T, 3.3 V, 40 W, R/TP, 4.3 V, 6.5 V, 5 A, R/TP, 2P, 1 SEMTECH CORPORATION	
6	FB507	Filter, Bead	SFBH0008102	BLM15HD182SN1D 1800 ohm 1.0X0.5X0.5 25% 2.2 ohm 0.2A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	C531, C532	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	L108	Inductor, Multilayer, Chip	ELCH0001033	HK1005 1N5S-T 1.5NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	L114	Inductor, Multilayer, Chip	ELCH0003819	LQG15HS12NJ02D 12NH 5% - 300mA - - 0.28OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L103, L104	Inductor, Multilayer, Chip	ELCH0003832	LQG15HS2N2S02D 2.2NH 0.3NH - 300mA - - 0.12OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	L202	Inductor, Multilayer, Chip	ELCH0003839	LQG15HS22NJ02D 22NH 5% - 300mA 0.42OHM 1.9GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L504, L505	Inductor, Multilayer, Chip	ELCH0003842	LQG15HSR10J02D 100NH 5% - 150mA 1.25OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L401, L402	Inductor, Multilayer, Chip	ELCH0012503	LQW15AN56NJ00D 56NH 5% - 200mA 1.17OHM 2.8GHZ 25 NON SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L201	Inductor, Wire Wound, chip	ELCP0009410	LQM2HPN3R3MG0 LQM2HPN3R3MG0, 3.3 uH, N, 2x2.5x1.0, R/TP, chip power MURATA MANUFACTURING CO., LTD.	
6	L801	Inductor, Wire Wound, Chip	ELCP0012801	MIPS2520D1R5-LG 1.5UH 30% - 1.2A 1.2 1.2 0.1OHM -- SHIELD 2.5X2X1MM NONE R/TP FDK CORPORATION.	
6	CN601	Connector, BtoB	ENBY0036001	GB042-40S-H10-E3000 40P 0.4MM STRAIGHT SOCKET SMD R/TP 1M ENGINEERING PLASTIC UL94V-0 AU OVER NI LS Mtron Ltd.	
6	CN401	Connector, I/O	ENRY0010501	GU075-5P-SD-E1500 5P 0.65MM ANGLE RECEPTACLE DIP R/TP - LS Mtron Ltd.	
6	J301, J302	Card Socket	ENSY0022102	GCA26A-6S-H16-M-E1000 SIM 6P ANGLE SMD R/TP - LS Mtron Ltd.	
6	S301	Socket, Card	ENSY0023601	SCHA4B0402 Micro-SD 8P ANGLE SMD R/TP - ALPS ELECTRIC KOREA CO., LTD.	
6	SW101	Connector, RF	ENWY0008701	MS-156C NONE STRAIGHT SOCKET SMD T/REEL AU 50OHM 400mDB HIROSE KOREA CO., LTD	
6	Q501	FET	EQFP0000101	2SJ347 P-CHANNEL MOSFET -20V -7 -0.05A 40OHM 100mW SSM R/TP 3P TOSHIBA	
6	R207, R216	Resistor, Chip	ERHY0000254	MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R302, R303, R304, R305, R306	Resistor, Chip	ERHY0000275	MCR01MZP5J563 56KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R102, R103, R104, R520, R521	Resistor, Chip	ERHY0003301	MCR01MZP5J101 100OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R409	Resistor, Chip	ERHZ0000203	MCR01MZP5F1002 10KOHM 1% 1/16W 1005 R/TP - ROHM.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R204, R407, R514	Resistor, Chip	ERHZ0000204	MCR01MZP5F1003 100KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R405, R607, R608	Resistor, Chip	ERHZ0000206	MCR01MZP5F10R0 10OHM 1% 1/16W 1005 R/TP - ROHM.	
6	R402	Resistor, Chip	ERHZ0000295	MCR01MZP5F5102 51KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R403, R404, R504	Resistor, Chip	ERHZ0000402	MCR01MZP5J100 10OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R213, R308, R311, R312, R313	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R209, R214, R215, R301, R309, R310, R418, R503, R601, R605, R606	Resistor, Chip	ERHZ0000406	MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R501, R510	Resistor, Chip	ERHZ0000407	MCR01MZP5J105 1MOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R217, R218, R408, R509, R518, R522	Resistor, Chip	ERHZ0000443	MCR01MZP5J222 2.2KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R513	Resistor, Chip	ERHZ0000445	MCR01MZP5J224 220KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R211	Resistor, Chip	ERHZ0000449	MCR01MZP5J243 24KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R203	Resistor, Chip	ERHZ0000475	MCR01MZP5J392 3.9KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R512	Resistor, Chip	ERHZ0000483	MCR01MZP5J470 47OHM 5% 1/16W 1005 R/TP - ROHM.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R202	Resistor, Chip	ERHZ0000484	MCR01MZP5J471 470OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R307, R314	Resistor, Chip	ERHZ0000485	MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R205	Resistor, Chip	ERHZ0000499	MCR01MZP5J562 5.6KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R410	Resistor, Chip	ERHZ0000506	MCR01MZP5J682 6.8KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R508	Resistor, Chip	ERHZ0000529	MCR01MZP5J152 1.5KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R212	Resistor, Chip	ERHZ0000531	MCR01MZP5J271 270OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R208	Resistor, Chip	ERHZ0002401	RC1005J123CS 12KOHM 5% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R210	Resistor, Chip	ERHZ0003801	MCR01MZP5J5R1 5.1OHM 5% 1/16W 1005 R/TP - ROHM.	
6	U501	IC, Comparator	EUSY0250501	NCS2200SQ2T2G NCS2200SQ2T2G, SC70, 5 PIN, R/TP, Comparator, pin compatible to EUSY0077701 - - SC70 R/TP 5P - ON SEMICONDUCTOR	
6	U302	IC, Analog Switch	EUSY0260001	FSA2257L10X 1.65~5.5 50SEC 20SEC 0W MICROPAC R/TP 10P 2 FAIRCHILD SEMICONDUCTOR	
6	U601	IC, Sub PMIC	EUSY0344403	RT9396GQW QFN, 24, R/TP, 4CH+2LDO, IC, Sub PMICIC, Sub PMIC RICHTEK TECHNOLOGY CORP.	
6	U803	IC, LDO Voltage Regulator	EUSY0407101	BU28TD4WNVX SSON004, 4, R/TP, 2.8V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	
6	U701	IC, Bluetooth	EUSY0418701	BCM2070B2KUBXG 2.3VTO5.5V 158.4mW 42P - WLBGA R/TP 42P BROADCOM ASIA DISTRIBUTION PTE LTD	
6	M501	IC, Audio Sub System	EUSY0420001	TPA2055D3 1.6~5.5V 0W WLCSP R/TP 20P - TEXAS INSTRUMENTS INCO.	
6	U201	IC, Digital Baseband Processor, GSM	EUSY0429401	PMB8815 , 281, EDGE Rx, ARM11 208MHz, NAND booting, 2.0Mp, FMR, IC, Digital Baseband Processor BGA R/TP 281P INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	U402	IC, Resistive Touch Screen Controller	EUSY0430501	SX8650 WLCSP , 12 , R/TP , Touch Screen Controller , ; , IC, A/D Converter SEMTECH CORPORATION	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	U802	IC Assembly	EUSY0434401	BCM43362SKUBG BCM43362SKUBG BROADCOM ASIA DISTRIBUTION PTE LTD	
6	X801	Oscillator, TCXO	EXST0001901	TG-5010LH-87N 26MHZ 2.5PPM 2.8V 32.0x25.0x10.0MM - SMD R/TP EPSON TOYOCOM CORP	
6	X202	Crystal	EXXY0024301	CM315(12.5PF) 32.768KHZ 20PPM 12.5PF 32*15 SMD R/TP CITIZEN DISPLAYS CO., LTD.	
6	X201	Crystal	EXXY0025701	TSX- 3225 TSX- 3225, 26 MHz, 10 PPM, 8 pF, 40 ohm, SMD, 32X25X0.6, X-Tal (Infinion chip), Pb-Free EPSON TOYOCOM CORP	
6	J501	Jack, Phone	EAG62831701	KJA-PH-3-0176 4P 4P ANGLE R/TP 3.5M BLACK 5P 6.5x12.6x4.0t, Short Detect, All DIP type KSD CO., LTD	
6	CN402	Connector, Terminal Block	EAG62832501	KQ03LV2-3R 3P 3.00MM ANGLE SMD T/REEL - HIROSE KOREA CO., LTD	
6	FL101	Filter, Saw, Dual	EAM62071301	B9836 GSM QUAD 1.8*1.4*0.4 SMD R/TP 10P EPCOS PTE LTD.	
6	U401	IC, Mini ABB	EAN61833301	LP8727 1.6V to 5.5V 0SEC 0SEC 0W 8 Mini ABB Basic MUIC, Charger IC WL-CSP R/TP 25P NATIONAL SEMICONDUCTOR ASIA PACIFIC PTE. LTD.	
6	U301	IC, MCP, NAND	EAN61927501	H9DA2GH1GHMMMR-46M NAND/2G SDRAM/1G 1.7VTO1.95V 8.0x9.0x0.9 TR 130P NAND+DDR SDRAM FBGA 2Gb NAND(LB/128Mx16)+1Gb DRAM(DDR/200MHz/16Mx4x16) HYNIX SEMICONDUCTOR INC.	
6	U101	Module, Tx Module	EAT61353301	RF7171 33DBM, 33DBM, 30DBM, 30DBM 0DB 36%, 36%, 32%, 32% 0A 80UA 0DB 0DBM 0DBM 24P 6.63x5.24x1.015MM GPRS QUAD TX DUAL RX MODULE, SP4T, 6.63*5.24*1.015, 24pin RF MICRO DEVICES INC	
6	C524	Capacitor, Ceramic, Chip	ECCH0000129	MCH155A121JK 120pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C231	Capacitor, Ceramic, Chip	ECCH0000137	C1005X7R1H331KT000F 0.33nF 10% 50V X7R - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C108, C109, C110, C232, C233, C501, C711, C712	Capacitor, Ceramic, Chip	ECCH0000143	MCH155CN102KK 1nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C101, C702, C706, C707	Capacitor, Ceramic, Chip	ECCH0000155	MCH153CN103KK 10nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C518, C520	Capacitor, Ceramic, Chip	ECCH0000179	GRM155R71C223K 22nF 10% 16V X7R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C118, C120	Capacitor, Ceramic, Chip	ECCH0000180	GRM1555C1H3R3C 3.3pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C220	Capacitor, Ceramic, Chip	ECCH0000182	GRM155R61A104K 0.1uF 10% 10V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	ZD402, ZD403, ZD404, ZD405	Varistor	SEVY0003901	EVL5M02200 5.5V 0% 480F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	VA301	Varistor	SEVY0004001	EVL18S02003 18V 0% 3F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	VA506, VA507	Varistor	SEVY0005202	EVL5S02100 5.5V 0% 100F 1.0*0.5*0.6 UL SMD R/TP AMOTECH CO., LTD.	
6	FB501	Filter, Bead	SFBH0007102	BLM15AG100SN1D 10 ohm 1.0X0.5X0.5 5 ohm 0.05 ohm 1A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	FB201	Filter, Bead	SFBH0007103	BLM15BB750SN1D 75 ohm 1.0X0.5X0.5 25% 0.4 ohm 0.3A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	FB701, FB802	Filter, Bead	SFBH0008101	BLM15AG601SN1D 600 ohm 1.0X0.5X0.5 25% 0.6 ohm 0.3A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	FL401	Filter, EMI/Power	SFEY0007101	ICVFP10181E301FR ESD/EMI 0HZ 300pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	FL601, FL602, FL603	Filter, EMI/Power	SFEY0010501	ICVE10184E150R101FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	FL604, FL605	Filter, EMI/Power	SFEY0011601	ICVE10184E150R500FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	C505, C514, C515, C516, C517	Capacitor, Ceramic, Chip	ECCH0000198	CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R - 55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C212, C213	Capacitor, Ceramic, Chip	ECCH0002002	C1005X7R1A473KT000F 47000pF 10% 10V Y5P - 30TO+85C 1005 R/TP - TDK CORPORATION	
6	C202	Capacitor, Ceramic, Chip	ECCH0005603	GRM188R61A225K 2.2uF 10% 10V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C222, C503	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C603, C605, C611, C701, C705, C812, C813, C827	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C612, C614	Capacitor, Ceramic, Chip	ECCH0010501	GRM1555C1H7R5D 7.5pF C0G TYPE(No X7R) MURATA MANUFACTURING CO., LTD.	
6	C103	Capacitor, TA, Conformal	ECTH0001704	F981A226MSA 22uF 20% 10V 2.2A -55TO+85C 4OHM 2.2X1.25X1.2MM NONE SMD R/TP - NICHICON CORPORATION, EAST JAPAN SALES OFFICE	
6	C407	Capacitor, TA, Conformal	ECTH0002703	TCTAL1A107M8R 0.0001F 20% 10V 50UA - 55TO+125C 0OHM 3.2x1.6x1.1 NONE SMD R/TP ROHM CO., LTD.	
6	C526	Capacitor, TA, Conformal	ECTH0004807	TCM1A106M8R 10F 20% 10V 500mA -55TO+85C 15OHM - - SMD R/TP ROHM.	
6	C117	Capacitor, Ceramic, Chip	ECZH0000802	C1005C0G1H010CT 1pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	L117	Capacitor, Ceramic, Chip	ECZH0000822	C1005C0G1H1R5CT000F 1.5pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C113	Capacitor, Ceramic, Chip	ECZH0000841	C1005C0G1H560JT000F 56pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C219	Capacitor, Ceramic, Chip	ECZH0001210	C1005Y5V1A474ZT000F 470nF -20TO+80% 10V Y5V -30TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	C204, C205, C230, C238	Capacitor, Ceramic, Chip	ECZH0001217	GRM155R60J474K 470nF 10% 6.3V X5R -25TO+70C 1005 BK-DUP - MURATA MANUFACTURING CO., LTD.	
6	C201, C203, C206, C216, C217, C224, C302, C303, C304, C307, C308, C309, C311, C312, C313, C315, C318, C402, C405, C413, C414, C528, C530	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C221	Capacitor, Ceramic, Chip	ECZH0025502	GRM219R60J226M 0.000022F 20% 6.3V X5R -55TO+85C 2012 R/TP 0.85MM MURATA MANUFACTURING CO., LTD.	
6	D401, D402, D403	Diode, TVS	EDTY0009401	VMNZ6.8CST2R 5.78V 0 10V 0A 100mW VMN2 R/TP 2P 1 ROHM.	
6	D201, VA501	Diode, TVS	EDTY0010501	RCLAMP1521P.TCT 15V 16.7 28V 4A 0W SLP1006P2 R/TP 2P 1 SEMTECH CORPORATION	
6	ZD501, ZD502	Diode, TVS	EDTY0012102	PESD5V0V1BL SOD882, 5 V, 45 W, R/TP, 5V, 7.8V, 12.5V, 4.8A, 2P, 1 STC CORP.	
6	C522, C523	Capacitor, Ceramic, Chip	ECCH0000138	MCH155CN391KK 390pF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM.	
6	C506, C507	Capacitor, Ceramic, Chip	ECZH0001108	C1005X7R1E682KT000F 6.8nF 10% 25V X7R -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R201, R805, R806	PCB ASSY, MAIN, PAD SHORT	SAFP0000401	LG-LU3000 LGTBK, MAIN, A,	
6	C531, C532	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	L109, L111, L112, L113, L116	Inductor, Multilayer, Chip	ELCH0001408	LL1005-FHL6N8J 6.8NH 5% - 300mA 0.23OHM 5.6GHZ 9 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	C408, C703, C704, C801, C803, C824	Capacitor, Ceramic, Chip	ECCH0000110	MCH155A100D 10pF 0.5PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C208, C214, C215, C218, C310, C401, C404, C411, C412, C508, C509, C604, C608, C609, C610, C807, C828, C829, C830	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R519, R603	Wire Pad, Open	SAFO0000501	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM_1005_DNI	
6	C111, C510, C511, C519, C527, C529, C533, C534	Capacitor, Ceramic, Chip	ECCH0000120	MCH155A390J 39pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C409, C502, C821	Capacitor, Ceramic, Chip	ECCH0000117	CL05C270JB5NNNC 27pF 5% 50V NP0 -55TO+125C 1005 R/TP 0.5 SAMSUNG ELECTRO-MECHANICS CO., LTD.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C107, C822	Capacitor, Ceramic, Chip	ECZH0001002	C1005CH1H0R5BT000F 0.5pF 0.1PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R802	Resistor, Chip	ERHZ0003001	MCR01MZP5F3002 30KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	L118	Inductor, Multilayer, Chip	ELCH0004711	1005GC2T22NJLF 22NH 5% - 200mA 0.8OHM 1.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C114, C314, C317, C325, C406	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C536, C537	Capacitor, Ceramic, Chip	ECCH0000163	C1005X5R473KDT 47nF 10% 10V X5R -55TO+85C 1005 R/TP - NEOTECH CO., LTD	
6	BAT201	Capacitor Assembly	SMZY0023501	PAS311HR-VG1 3.8 Backup Capacitor 0.03F, Module Assembly, KOREA TAIYO YUDEN.CO., LTD.	
6	FB801	Filter, Bead	EAM62131201	CIM05J121NC 120 ohm 1.0X0.5X0.5 25% 0.3 ohm 0.5A SMD R/TP 2P 0 SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	C207, C210, C239, C809, C820, C826	Capacitor, Ceramic, Chip	ECZH0001216	C1005X5R1A224KT000E 220nF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	C105, C123, C525, C708, C815, C825	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C229, C305, C601, C602, C606, C607	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	C209, C240, C241, C810	Capacitor, Ceramic, Chip	ECCH0000113	MCH155A180J 18pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	FB505, FB506, L502, L503	Filter, Bead	SFBH0007101	BLM15AG121SN1D 120 ohm 1.0X0.5X0.5 25% 0.25 ohm 0.5A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	Q202	TR, Bipolar	EBK61592601	2SC5662 NPN 3V 20V 11V 50mA 500NA 0 150mW VMT3 R/TP 3P ROHM Semiconductor KOREA CORPORATION	
6	FB507	Filter, Bead	SFBH0008102	BLM15HD182SN1D 1800 ohm 1.0X0.5X0.5 25% 2.2 ohm 0.2A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	C104	Capacitor, Ceramic, Chip	ECZH0000846	C1005C0G1H8R2CT000F 8.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C102, C119, C121, C320, C321, C322, C323, C324, C403	Capacitor, Ceramic, Chip	ECZH0000830	C1005C0G1H330JT000F 33pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	L805	Inductor, Multilayer, Chip	ELCH0001403	LL1005-FHL1N0S 1NH 0.3NH - 400mA 0.1OHM 20GHZ 7 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	Q201	TR, Bipolar	EBK61572201	LSCR523EBFS8 NPN 5V 50V 50V 100mA 100NA 120~560 150mW EMT3 R/TP 3P ROHM Semiconductor KOREA CORPORATION	
6	R401, R419, R420	Resistor, Chip	ERHZ0000486	MCR01MZIP5J473 47KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	VA508, VA509	Diode, TVS	EDTY0012501	UCLAMP3311T.TCT SLP1006P2T, 3.3 V, 40 W, R/TP, 4.3 V, 6.5 V, 5 A, R/TP, 2P, 1 SEMTECH CORPORATION	
6	R704, R804	Resistor, Chip	ERHY0000128	MCR01MZIP5F1502 15KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	VA502	Varistor	SEVY0005201	EVLC5S02050 5.5V 0% 50F 1.0*0.5*0.6 - SMD R/TP AMOTECH CO., LTD.	
6	R507, R523, R604, R801	Wire Pad, Short	SAFP0000501	LG-VS760 VRZ	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R105, R417, R511, R517, R708	Resistor, Chip	ERHZ0000404	MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C211, C223	Capacitor, Ceramic, Chip	ECCH0000151	CL05B472KB5NNNC 4.7nF 10% 25V X7R - 55TO+125C 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C504, C535, C616, C617, C618, C804, C823	Capacitor, Ceramic, Chip	ECCH0002001	C1005JB0J104KT000F 0.1uF 10% 6.3V Y5P - 30TO+85C 1005 R/TP - TDK CORPORATION	
6	FL801	Filter, Ceramic	SFCY0000901	LFB212G45SG8A166 BPF 2.45KHZ 100Hz SMD R/TP 4P MURATA MANUFACTURING CO., LTD.	
6	VA401, VA402, VA601	Varistor	SEVY0001001	EVLC14S02050 14V 0% 50F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	L105, L106, L803	Inductor, Multilayer, Chip	ELCH0003826	LQG15HS3N3S02D 3.3NH 0.3NH - 300mA - - 0.17OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	U801	Module, FEM(Front End Module)	EAT61493101	XM2400LU-DL1201 10DBM 12.5DB 10% 1UA 7mA 1.6DB 23DBM 3.5DBM 12P 1.6x1.6x0.4MM - MURATA MANUFACTURING CO., LTD.	
6	C301, C306	Capacitor, Ceramic, Chip	ECZH0001421	C1608X5R0J225KT000N 2.2uF 10% 6.3V X5R - 55TO+85C 1608 R/TP - TDK KOREA COOPERATION	
6	C115, C818	Capacitor, Ceramic, Chip	ECCH0000701	C1005C0G1H1R2CT000F 1.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK CORPORATION	
6	L802	Inductor, Multilayer, Chip	ELCH0001057	1005GC2T3N9SLF 3.9NH 0.3NH - 300mA 0.22OHM 4GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C521	Capacitor, Ceramic, Chip	ECCH0005604	GRM188R60J106M 10000000 pF, 6.3V, M, X5R, TC, 1608, R/TP, 0.8 mm MURATA MANUFACTURING CO., LTD.	
6	C816	Capacitor, Ceramic, Chip	ECCH0000112	MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C802, C806, C814	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R - 55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	U502	IC, Analog Switch	EUSY0186504	FSA2259UMX QFN , 8 , R/TP , Dual SPDT , ; , IC, Analog Switch FAIRCHILD SEMICONDUCTOR	
6	L804	Inductor, Multilayer, Chip	ELCH0004733	1005GC2T4N3SLF 4.3NH 0.3NH - 300mA 0.23OHM 3.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	L110	Inductor, Multilayer, Chip	ELCH0003816	LQG15HS3N6S02D 3.6NH 0.3NH - 300mA 0.18OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	

14. EXPLODED VIEW & REPLACEMENT PART LIST

14.3 Accessory

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
2	EBX000000	Accessory, Data Cable	SGDY0018001	LG0029 LG0029 Micro USB, 0.8M ningbo broad telecommunication co., ltd	
2	EAB010200	Earphone, Stereo	SGEY0003744	EMB-LGE004MSKB 3mW 16OHM 115DB 85HZTO126HZ 1M BLACK 3.5 L TYPE STEREO 4POLE PLUG - CRESYN CO., LTD	
2	AFN053800	Manual Assembly, Operation	AFN75492047	LGT515.AINDUK ZZ:Without Color LGT515 manual assy for IND	
3	MBM087200	Card, Warranty	MBM63456201	PRINTING LGP990.AINDDW ZZ:Without Color -	
3	SAC000000	PCSYNC CD	SAC35316401	DATA CD CD -	
3	MFL053800	Manual, Operation	MFL67202050	COMPLEX LGT515.AINDUK ZZ:Without Color LGT515 manual for IND	
2	EAY060000	Adapters	SSAD0031502	STA-U12IS 150Vac~350Vac 5.1V 700mA 5060 CE NONE NONE - SALCOMP OY	
2	SBPL00	Mobile Phone Battery Li-Ion	SBPL0095402	LGIP-530A LGIP-530A, 3.7 V, 1100 mAh, 1 CELL, PRISMATIC , 553450, INNERPACK, WW TOCAD DONGHWA	